# The Cost of Failure: An Empirical Look at the Financial Effect of Business Failure on the Self-Employed

A dissertation submitted in partial fulfillment of the requirements of the degree of the
Doctor of Philosophy in Business Administration

The Darden Graduate School of Business Administration
University of Virginia

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August 2005

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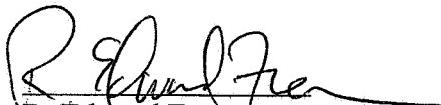
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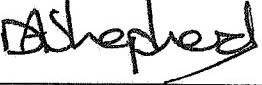
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Report Documentation Page		*Form Approved* *OMB No. 0704-0188*
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.		

1. REPORT DATE **01 AUG 2005**	2. REPORT TYPE **N/A**	3. DATES COVERED **-**

4. TITLE AND SUBTITLE **The Cost of Failure: An empirical Look at the Financial Effect of Business Failure on the Self-Employed**	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **University of Virginia**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) **Department of the Air Force, AFIT/CIA WPAFB, OH**	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT **Approved for public release, distribution unlimited**

13. SUPPLEMENTARY NOTES **The original document contains color images.**

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT **UU**	18. NUMBER OF PAGES **141**	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**			

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

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Abstract

Despite a long history of research into failure rates and the causes of small business failure, we know very little about the financial consequences of losing a business. In this dissertation I take a longitudinal sample of failed self-employed business owners from the Panel Study of Income Dynamics and compare their wealth accumulation to that of demographically comparable families who have not experienced entrepreneurial failure. Surprisingly, business failure is associated with slightly higher wealth at closure, with the resulting "failure bonus" dissipating in five years or less. I also conduct exploratory analysis to further characterize the wealth accumulation of failed households and analyze their propensity for subsequent self-employment.

The higher wealth observed immediately after failure indicates that the typical household involved in self-employment may still retain a significant amount of the precautionary savings that were accumulated in preparation for an attempt at entrepreneurship. It suggests that although some households undoubtedly do lose money when a business fails, most escape relatively unscathed by exiting quickly rather than persisting in the face of an unfavorable business environment. This behavior has implications for how we interpret liquidity constraints to entrepreneurship, as well as for government policy in support of small businesses.

Contents

1 Introduction:

It is an article of faith among those who follow entrepreneurship that many if not most of new businesses will fail within a fairly short period of time. The estimates vary wildly, from a failure rate of 9 out of 10 businesses within the first year according to popular folklore (reported but doubted in Phillips and Kirchhoff, 1989) to a mortality rate among U.S. firms as low as 1 in 3 within the first 2 years of operation (Headd, 2003). Even at the low end, the probability of failure is considered to be nontrivial.

Some attempts have also been made to determine what causes new business failure, but these have had limited success beyond the conclusion that most fail because of a lack of capital, mismanagement or a tough external environment (Bruno, Leidecker and Harder, 1986; Wichmann, 1983; Larson and Clute 1979; Fredland and Morris, 1976). Instead, most research in strategy and organizational theory tends to focus on what helps a firm survive and prosper rather than what leads to failure.

However, despite this interest into the rates and causes of failure, very little effort has gone into investigating what might be of great concern to someone standing at a career crossroads, contemplating self-employment: the consequences of failure to those entrepreneurs who are forced out of business. It is this sizable gap in the literature that I hope to help address in this dissertation.

We hear anecdotes about the entrepreneur who lost it all, yet we also know of others who crashed a series of businesses on their way to the one that succeeded brilliantly. There are competing storylines in the literature as well. McGrath (1999) invokes real option theories to contend that the entrepreneur pays a small cost to

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investigate a potential opportunity and only invest in those that are likely to be profitable, and likewise Sarasvathy (2001) emphasizes the concept of affordable loss as a key feature of effectual reasoning. But if the notion of escalation of commitment (Staw, 1981; Staw and Ross, 1987) applies to an entrepreneur as well as a manager we can expect a failing venture to consume increasing amounts of capital as he throws good money after bad in an effort to keep it afloat. Risk-seeking behavior in the domain of losses (Khaneman and Tversky, 1979) and a preoccupation with sunk costs (Arkes and Blumer, 1995) could also mean substantial costs may be incurred when a venture failed. As of now we have very little knowledge regarding the financial consequences of failure on the entrepreneur and thus no basis to determine how serious a penalty is associated with failure.

Decision theorists teach us that a rational decision maker weighs the expected value of a risky choice by multiplying the probability of each possible outcome by the impact of that outcome. We have information on failure rates, though a lot depends upon one's definition of failure (Headd, 2003), the particular industry, and other framework-dependent considerations such as the richness of environmental resources (Hannan and Freeman, 1984) or the human capital of the entrepreneur/start-up team (Davidsson and Honig, 2003; Gimeno, Folta, Cooper and Woo, 1997). Suppose a prospective entrepreneur is able to arrive at satisfactorily precise odds of success. Even if such a thinker were able to overcome bounded rationality and attain the omniscience that would allow such a calculation, he would still have difficulty in valuing the impact of failure, or even success. The prospect of a sufficiently catastrophic failure can result in a decision not to venture even if its likelihood is very low. Ultimately, the student sitting in his

entrepreneurship class and the employee considering striking out on her own must come

to ponder the same daunting question that causes so many prospective entrepreneurs to

flinch and remain in traditional employment: *What will happen to me if I don't succeed?*

This question, perhaps the most countervailing consideration in the decision to

venture, has received very little attention in entrepreneurship literature. As will be

discussed in the next chapter, we have information about the *rates* of failure, and some

research into the *causes* of failure, but very little into the *consequences* of failure. This is

the gap I wish to address. My central question is simple: How does the economic failure

of a firm impact the wealth of the entrepreneur?

The Financial Cost of Closure

Only two studies could be located which have examined the financial impact of

failure on the entrepreneur. The first is Dennis and Fernald (2001), who find that even

businesses that terminate with losses do not necessarily set the owner back financially.

Their use of a National Federation of Independent Business (NFIB) telephone survey of

almost 800 households with recent business start or stop activity indicates that just 14%

of respondents felt themselves to be worse off financially after a business termination.

Only one in five respondents who ran an unprofitable business reported a negative impact

to their personal finances. By far the most common result, even for those who closed

profitable firms, was no change in the owner's perceived financial status (Dennis and

Fernald, 2001). The authors also report an anomalous pattern: almost half of those who

report that they are better off after launching and closing their business had firms that

either lost money or just broke even. Although this result could come from selling

mediocre businesses at a profit as a means of closure, the authors note "[n]onetheless,

these explanations are not totally satisfactory and leave some doubt that the survey

questions were not as exacting as they might have been." (Dennis and Fernald, 2001, pp

79-80)

The only study available which gathered financial data from the owners of failed

businesses was McNeill and Fullenbaum's (1994) telephone survey of 101 entrepreneurs

who declared Chapter 7 bankruptcy[1] in Maryland. McNeill and Fullenbaum find that the

bankrupt owners recover fairly quickly, in terms of both current income and net worth

(McNeill and Fullenbaum, 1994, pp. 18-19).

The authors come to this conclusion on the basis of a survey question that asks if

the respondent is better off than before starting the business, worse off, or about the same.

(McNeill and Fullenbaum, 1994, p. App-A-8). Not only is the survey question one of

perception of financial status, but it does not compare the failed entrepreneurs to other

individuals who have not failed. Nor does it address the opportunity costs paid by

attempting the business or take into account the natural accumulation of wealth enjoyed

by the median U.S. household over a period of time even as short as a few years (Lupton

and Stafford, 2000). The authors collected some court-ordered information on personal

and business assets but found it a bit too suspect to work with: "A business owner filing

for bankruptcy has every incentive to minimize assets and therefore pay out less to

creditors. For this reason a decision was made not to put too much emphasis on the asset

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[1] Chapter 7 refers to the court procedure for closure and liquidation of the business, as opposed to Chapter 11, which grants a "stay" and reorganization of debt to allow the business to continue to operate with the hope of ultimately emerging as a profitable entity.

data and not to calculate a net worth value for the former business owners." (McNeill and Fullenbaum, 1994, p. 7).

Instead, respondents provided the value of their personal assets and liabilities by selecting one of five categories (less than $10,000; $10,000 to $99,000, etc). From this the authors estimated median assets of $152,000 and a median debt of $22,000 for the bankrupt owners. The dollar ranges of the five categories tended to be quite large; therefore, these measures must be regarded with caution. Interestingly, 61% of the bankrupt founders indicated that they would have started the business again.

These two studies have provided a valuable first glimpse of how quickly entrepreneurs recover from failure. Both indicate that an unsuccessful closure need not be devastating, and suggest that the founders have few regrets. However, these studies can be improved upon, and my objective is to more precisely quantify the financial costs of failure employing a less extreme definition of failure than bankruptcy, an assuredly costly but relatively rare class of failure.

As mentioned above, there is a considerable gap in our knowledge of entrepreneurship regarding the consequences of failure. How does business failure affect the individual's wealth relative to peers who have not entered self-employment, or have done so successfully? If failure sets the individual back by depleting savings and/or increasing debt, how long does it take the individual on average to recover and "catch" his/her peers? What factors may impact a failed entrepreneur's propensity to enter self-employment again?

To answer these questions, I use mixed-effects growth curve modeling techniques to examine the wealth accumulation of entrepreneurs conditional on failure to that of their peers. As I will explain further in the methodology section, growth curve modeling has been proven in other disciplines but remains relatively novel to management and entrepreneurship studies.

The value of understanding entrepreneurial failure

Understanding the consequences of failure has important ramifications for a number of the stakeholders involved in the start-up process. For instance, lenders typically charge entrepreneurs a premium to provide funds for an activity with uncertain returns. Incorporation should help limit the personal losses to entrepreneurs in the case of a washout, but loans to unincorporated ventures (and even loans to small corporations) are often collateralized by the personal assets of the founder (Avery, Bostic, and Samolyk, 1998; Ang, Lin and Tyler, 1995). How extensive are the losses to these start-up owners? Is business lending as risky as it is perceived to be?

The question has implications for the failed individual's opportunities for future entrepreneurship as well. A number of findings have indicated the liquidity constraints that must be overcome to enter self employment (Evans and Leighton, 1989; Evans and Jovanovic, 1989; Holtz-Eakin, Joulfaian and Rosen, 1994). If failure is financially debilitating, it follows that an individual will be less likely to attempt to start another business until she can recover from her losses. If we are to examine serial entrepreneurship as a profession unto itself (MacMillan, 1986; Sarasvathy and Menon,

2002), we must account for the financial impact of a previous failure when future endeavors are contemplated.

The financial impact of failure may also bear on government policy. Small businesses and entrepreneurial start-ups are lauded as the engines of the American economy (Birch, 1979) and indeed of economies around the world (Phan and Foo, 2004) but little is known about how (or even if) the failures strain the system through job losses, lost productivity, bankruptcies and asset erosion. Obviously, the present study can only presume to address the personal consequences of failure, not the macroeconomic effects. However, this alone is an important facet of investigating the downside of self-employment from a policy perspective.

Finally, and perhaps most importantly, more information on the impact of failure would be particularly valuable to those contemplating starting their own business. While we as educators work to define what should be taught in our entrepreneurship courses, a brief module on the consequences of failure would be a useful addition to students who, almost without exception, have enrolled in the course as an elective. Presumably these students chose the course because they harbor an interest in actually starting their own firm someday, and would find value in understanding and coping with the downside of entrepreneurship (Shepherd, 2004). With continuing debate in the field about what an entrepreneurship course should teach that is distinct from other parts of a general business education (Honig, 2004; Aronsson/Birch, 2004), our role as educators may be changing. Rather than teaching how to create business plans and dispensing tips for success, we may be of better service as motivators and encouragers, knowing that chance

cannot be ruled out as a large part of success. But to encourage and motivate in good conscience also means knowing and relating the consequences of failure.

Plan for the Dissertation

I will structure the dissertation along the following lines:

Chapter Two will begin by highlighting the existing literature on entrepreneurial failure, with special emphasis on the few studies that have attempted to address the economic impact on the unsuccessful entrepreneur. I examine the prior work on liquidity constraints in an effort to consider how the wealth believed necessary to begin a firm can be disentangled from post-failure wealth measurements. Chapter Two also addresses the relevant work in labor economics that provides the theoretical basis and empirical support for how wealth is accumulated over the career of the employee. One important example of this work is the extensive literature surrounding precautionary savings and its role in smoothing consumption patterns in the presence of uncertain income.

Chapter Three consists of the presentation of definitions and the development of the formal hypotheses to be tested in the paper. These are relatively straightforward, designed to see what the economic cost of failure, if any, is to a household of an individual involved in self-employment. Analysis will be done to determine the impact on asset growth rate as well as the absolute dollar impact of failure at each measurement period. In the spirit of exploratory data analysis (Tukey, 1977), I also examine some other post-hoc models and combinations of variables that may reflect additional insight into the

financial effect of failure. This section of the analysis will leave behind the control

households never involved in entrepreneurship and those running successful businesses to

examine only the households with failed firms. The findings that emerge from these are

likely to be interesting, but are to be taken as suggestive of future work. They will be

intended to investigate possible conditions and modifiers to the presence and extent of

entrepreneurial failure. These conjectures will be cast as propositions rather than

hypotheses to distinguish the two sets of tests. Some are targets of opportunity based on

variables included in the PSID, and can be incorporated into a model relatively easily.

Failure is described in terms of opportunity costs and the choice to forgo what, a

posteriori, turns out to have been a better alternative in wage employment. As will be

noted, there are a core set of hypotheses derived from the relevant literature and a second

set of exploratory hypotheses aimed at further characterizing the data set. This second set

of hypotheses is less formal than the first and represents post-hoc experimentation after

the statistical degrees of freedom on the primary set have been "expended."

Chapter Four details the dataset and methods used in the analysis, operationalizes and

justifies the choice of variables, and discusses the challenges and benefits of using

longitudinal data and mixed models. Data is taken from the Panel Study of Income

Dynamics (PSID), an ongoing large sample survey conducted yearly since 1968. The

PSID tracks the financial and health behaviors of almost 8,000 nationally representative

families, collecting detailed data on employment, income, savings and investment, and

wealth accumulation. The PSID began collecting wealth information in 1984, including

everything from the value of savings accounts, home equity, debt, and investments all the way down to the value of the respondents' cars. This set of measures will provide the fine-grained details necessary to compare the financial standing of failed entrepreneurs to those who work for others along with other important factors that influence wealth accumulation such as age, education and marital status.

A variety of statistical methods are employed in the analysis, the most important of which is mixed-effect growth curve modeling. This technique has proven useful in other fields for measuring *changes* in some continuous variable (often test scores in education or psychology, but wealth in the present case) *over time* with *the same subjects*. Other techniques used include logistic regression, probit regression, and the presentation and discussion of summary statistics relating to the data.

The main analysis, then, will concentrate on finding a) differences in the rate of wealth accumulation between failed entrepreneurs and their peers, and b) the dollar impact of entrepreneurial failure. The former can be represented by the interaction effect between dummy variable(s) $fail_{it}$ which indicates whether or not household i suffered a business failure at time t, and time variables. An alternative technique using time-lagged variables will also be used. The second hypothesis will estimate the coefficient(s) value of $fail_{it}$ which, when properly interpreted, yields the dollar impact of failure.

Household wealth will be the dependent variable for all mixed-effect analyses. Control variables include age, education, minority status, marital status, and current small business ownership. This chapter further discusses the choice of these particular variables and why certain others are not included.

Chapter Five details the results. The primary hypotheses will be addressed first, followed by the propositions and other patterns that emerged in the data.

Chapter Six summarizes the conclusions of the paper, outlines other possible paths to characterize the impact of failure, and explores what these findings might mean for students and practitioners. Some limited discussion is given to the non-economic aspects of failure and what roads might be available as part of a larger program of research.

Closing

William James asks "What difference would it practically make to anyone if this notion rather than that notion were true? If no practical difference whatever can be traced, then the alternatives mean practically the same thing, and all dispute is idle" (James, 1978: 28). I believe the impact and extent of entrepreneurial failure is one of those blind spots in our understanding where what we find out does matter, and it matters in an immediate way to those we teach, advise and inform.

My hope for the outcome of this research is simple. Although "nonsignificance" is typically an unwelcome result in statistical analysis, it would not be too disappointing to find that entrepreneurial failure exerts no lasting influence on an individual's wealth or future income. If this finding helps exorcise the demons that lurk in the prospective entrepreneur's mind which cause her to abandon her dreams for fear of the unknown consequences visited upon her if the venture fails, then it is useful knowledge. Although I am skeptical of accounts that glorify the entrepreneur as courageous, superhuman or even somehow "special", I believe that in many ways the entrepreneur is a living refutation of

the Separation Thesis, a person who pursues his life's projects in harmony with

enterprise, a person for whom the source of his paycheck is also an exercise of his

autonomy and (hopefully) a triumph of personal goals and values. If I find otherwise, that

failure has significant financial consequences for the entrepreneur, so be it. Let it be more

information for the prospective entrepreneur as she computes her own "felicific

calculus."

2 Literature Review: Failure, Wealth and the Impact of Wealth on Selection into Self-Employment

In the majority of scholarly research, the failed entrepreneur and the defunct business are merely the unfortunate data points surrounding the real quarry: the survivor, the "gazelle", the captain of industry. Almost all discussions of failure treat it as the converse of the survival, as the shadow of the thriving, successful new business. In the few empirical works which aim to investigate failure in its own right, failures have been (perhaps tellingly) operationalized as zeros in logistic regression models (Headd, 2003; Bates, 2002). Alternatively, they are treated as the detritus that gives shape to a hazard rate function (Reynolds, 1987; Boden, 2000).

Contrast these few studies with the hundreds of works aimed at finding the success or growth factors of new businesses (Duchesneau and Gartner, 1990; Cooper, Gimeno-Gascon and Woo, 1994; Tellis and Golder, 1996; Honig, 1998, and a lifetime of strategy literature), the determinants of survival (Audretsch, 1991; Bruderl, Preisendorfer and Ziegler, 1992; Boden and Nucci, 2000) and the personal characteristics of the entrepreneur (Brockhaus and Horwitz, 1985; Begley and Boyd, 1987; Evans and Leighton, 1989; Cooper, Gimeno-Gascon and Woo, 1994). This is understandable; after all, the unspoken goal of much of entrepreneurship research is to learn what contributes to success so that it can be replicated. We certainly wouldn't wish to focus on what causes failure in a bid to help entrepreneurs create more spectacular implosions. However, if failure is such a common phenomenon in entrepreneurship, it is worth understanding how often it happens, what causes it, and how it affects the founders: their finances, their employment, and their propensity to venture again.

What do we know about entrepreneurial failure?

Investigations into entrepreneurial failure thus far have centered around two main themes: the *rate* of failure, and the *causes* of failure. Neither stream has produced indisputable findings that are of immediate application to someone contemplating self-employment. Population ecology theory is notable for its attempt to integrate the two and may be of some use in making high-level statements about entrepreneurial failure.

Rates of failure

A persistent piece of folklore regarding the survival of new businesses states that 9 out of 10 will close after their first year, but attempts to track down the source of this old chestnut have been unsuccessful (Phillips and Kirchhoff, 1989). Older studies do present some grim failure rates for the entrepreneur but none that bad, and with enormous ranges: anywhere from 71% to 31% in the first five years (Watson and Everett, 1996). Part of the reason for this discrepancy is because authors use differing definitions of failure. Some authors define failure simply as discontinuance, which includes any change in ownership (c.f. Hutchinson, Hutchinson and Newcomer, 1938; Fredland and Morris, 1976; Phillips and Kirchoff, 1989) as well as outright cessation of business (c.f. Cooper, Dunkelberg and Woo, 1988; Dunne, Roberts and Samuelson, 1989; Reynolds, 1987)[2].

Early attempts to determine failure rates relied heavily on Dun and Bradstreet (D&B) data. However, the shortcomings of the D&B database are significant. As detailed in Williams (1993), problems include the conflation of closure with failure and the

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[2] For an outstanding and comprehensive review of past failure rate studies and the various definitions used, see Watson and Everett, 1996.

sampling bias caused because D&B only tracks firms with trade credit. D&B also records a change in ownership for any reason as a closure. The conclusions of these studies peg the lower boundary of failure at 31% in the first five years (Williams, 1993) and an upper boundary of 60% within the first five years (Phillips and Kirchoff, 1989).

In fact, newer studies suggest that not only is rate of closure nowhere near this high, but that closure is not synonymous with failure. According to data collected by the U.S. Census Bureau, 66% of U.S. businesses with employees survive at least two years, 50% survive at least 4 years and 40% survive 6 years or more (Headd, 2003; U.S. Bureau of the Census, 1999). The Census approach avoids the non-response problem that plagues longitudinal studies of businesses by tracking each establishment's Employment Identification Number, required by the IRS, as a means of determining whether the business still operates. Similarly, Bruderl, et al. find that 76% of German businesses founded in 1985 survived 2 years and 63% survived 4 years (Bruderl, et al, 1992). These figures are quite different than the stark odds that conventional wisdom would have us believe faces the new entrepreneur.

Bankruptcy is a visible measure of failure, since the affected firm must file with the state. However, studies have revealed that bankruptcy is a rare event among businesses, although it is the small-firm bankruptcies that tend to fill the court dockets (Sullivan, Warren and Westbrook, 1998). Watson and Everett (1996), in a study of Australian retailers, find a cumulative bankruptcy rate of only 5.3% over the course of 10 years; about half of those succumbed in three years or less.

Causes of Failure

Of the thin literature on unsuccessful ventures, there are a number of attempts to characterize the reasons for failure. Venkataraman et al (1990) followed ten educational software companies and inductively developed a model for the failure of young, new firms in environments of high uncertainty. Their work suggests that knowledge-based firms with few tangible assets leverage relationships with key stakeholders to establish legitimacy. When transactions with these stakeholders fail, this tight coupling means that the entire viability of the firm is threatened with collapse. Those firms with accumulated slack are best able to cope. Since accumulated slack is often a function of the firm's longevity, the result is a possible mechanism by which the famed "liability of newness" (Stinchcombe, 1965) operates.

Shepherd, Douglas and Shanley (2000) flesh out the concept of liability of newness by proposing three dimensions of novelty that must be overcome to stave off failure. Departing from the retrospective nature of the population ecologists' analysis and the predestination mentality that follows from it, the authors instead provide risk-reduction strategies to help prevent the new entrepreneur from being ground to pieces in the gristmill of failure.

These pieces seem to be exceptions in that they attempts to provide explicit mechanisms by which failure occurs. Most work that investigates the causes of failure provides either factors that correlate with success/failure but often contain little actionable knowledge. For example, in their attempt to identify the reasons behind failure, Bruno, Leidecker and Harder (1986) tracked a cohort of 250 high-tech firms for

over 15 years, conducting interviews with a sample of ten founders whose firms were no longer operating independently. They found that the entrepreneurs explained their firms' closures by a number of factors internal and external, from assuming an inappropriate amount of debt to entering highly competitive markets (Bruno et al, 1986). The distinct reasons given for failure exceeded the number of entrepreneurs interviewed for the study, indicating that a multitude of causes conspire to bring about the fall of a firm.

Cognizant of the bewildering variety of reasons for failure likely to be reported, Gaskill, Van Auken and Manning (1993) attempted to distill the primary causes to a few manageable constructs. Using factor analysis to probe the responses given by 130 failed small business owners in the apparel industry, they identify four factors common to most closures, including poor managerial/planning ability, a lack of working capital management, a highly competitive environment and problems with growth and overexpansion.

The usual culprit behind entrepreneurial failure falls under the distinctly unhelpful label of "poor management," which includes such subcategorical evils as managerial incompetence (Wichmann, 1983; Larson and Clute 1979) and inexperience (Peterson, Kozmetsky and Ridgway, 1983). A more useful conclusion of the "poor management" results may be that the causes of the failure were likely to be endogenous rather than external to the firm and thus within its control (Fredland and Morris, 1976), although such a strict division between external and internal in the dynamic world of entrepreneurship may be just as suspect. One account blames macroeconomic factors for between 30 and 50% of failures, depending on the definition of failure used (Everett and Watson, 1998). Examining the factors that led businesses to declare bankruptcy, Sullivan,

Warren and Westbrook (1998) find that over a third (37.8%) of the bankrupt founders

cited outside environmental conditions as the leading cause for their troubles, and 27.1%

cited internal operating difficulties as the primary problem.

     Asking failed entrepreneurs directly about the cause of their difficulties has

obvious drawbacks. Recognizing that the retrospective reasoning of entrepreneurs may be

colored by self-serving perceptions and post-hoc rationalizations, Zacharakis, Meyer, and

DeCastro (1999) interviewed eight failed entrepreneurs from the Colorado area and the

respective venture capitalists who worked with them and compared responses. Using

attribution theory (Fiske and Taylor, 1991; see also Shaver and Scott, 1991) as a lens,

they found that the entrepreneurs were more likely to attribute failure to causes internal to

the venture than external (58% to 42%), whereas the VCs were overwhelmingly more

likely to pin the cause of failure on the external business environment. This is somewhat

surprising, as a key tenet of attribution theory is the "fundamental attribution error", the

tendency to take more credit than one deserves for success but less responsibility than

one deserves for failure (Fiske and Taylor, 1991; Bettman and Weitz, 1983).

     Duchesneau and Gartner (1990) relied on quantitative analysis in identifying

factors associated with failure. In their analysis of start-ups in the fresh juice industry,

they administered extensive surveys and conducted site interviews with the management

of 26 firms, 13 of which succeeded and 13 of which could be considered failures. They

found a gestalt pattern that links 1) personal attributes of the entrepreneur, 2) start-up and

planning activities and 3) firm behaviors and strategies in conducting business. Some

factors associated with failure include failing to conduct up-front planning activities and

implement risk-reduction behaviors, purchasing the firm rather than founding it, and

attempting to personally direct too much of the start-up activity.

Another very different set of literature examines the failure of organizations in

general, but since a main finding of this camp seems to be that failure typically happens

early in the organization's life cycle, there may be some useful insights into bring into the

discussion of entrepreneurs. This well-known population ecology stream of research

takes a wide view of an environment's competing organizations to examine new firm

mortality rates within.

According to this literature, new firms encounter higher mortality rates than do

older organizations, a notion introduced by Stinchcombe (1965) and demonstrated

empirically in a number of papers (Singh, Tucker and House, 1986; Freeman, Carroll and

Hannan, 1983; Carroll and Delacroix, 1982). The hazard rate peaks at some point

between one and three years, possibly reflecting the depletion of new firms' initial assets

during a sort of honeymoon period (Fichman and Levinthal, 1991). The firm that survives

this period then enjoys a sharply decreased chance of dissolution as stakeholders learn to

trust and interact with the firm (Aldrich and Fiol, 1994), intra-organizational roles

become clearer (Hannan and Freeman, 1984), the firm learns and processes become more

efficient (Fichman and Levinthal, 1991).

By its focus on the organization and its fit with the environment, the population

ecology literature may suggest clues about failure as it applies to the entrepreneur. First,

the liability of smallness (Aldrich and Auster, 1986) indicates higher rates of closure for

the typical self-employed endeavor, but that very smallness may also mean minimal

losses for the founder.

Closure versus Failure

Note that most of the studies described above consider a closed firm to have

failed. However, it appears that equating closure with failure is misguided, at least from

the perspective of the entrepreneur. For example, using the Census Bureau's 1996

Characteristics of Business Owners (CBO) survey, Headd finds that almost a third (29%)

of the owners of firms that closed between 1992-1996 after 4-8 years of operation

regarded these closures as successful, with higher rates reported for women owners and

those under the age of 35 (Headd, 2003). He also notes that owners who closed firms

which had been founded with no start-up capital reported a high success rate, perhaps

because of low expectations or a fixed time frame of operation (Headd, 2003: 56). The

CBO tracks only firms with at least one non-owner employee, so its applicability to the

greater population of self-employed (many of whom have no other employees) is not

clear.

Bates, using the same dataset but not controlling for the business's birth year,

finds that 37.7% of closures are regarded as successful by their owners (Bates, 2002).

Although the CBO offered only a binary "successful/unsuccessful" measure rather than

reasons for the owners' characterizations, it is possible to speculate why a closure might

be successful. The owner could have planned to grow to a salable size and then exit, or

may have closed in order to retire or accept a better job proposition. The owner may have

acquired additional knowledge as a result of the start-up that is better exploited in another

context, perhaps another small business (Bates, 2002). Alternately, a respondent might deem a business successful for enabling him/her to live a particular lifestyle for a time, even if the venture was not profitable enough to remain viable. Bates finds that high human capital is associated with a successful closure (2002).

Conversely, if a firm closure is not necessarily a failure, nor is its survival necessarily a success. Gimeno et al (1997) propose that economic performance is not the only factor that decides firm survival. Their empirical findings suggest that the profitability aspirations of the owner(s) and their alternative uses of their human capital will mitigate the role of economic performance. If no better alternatives for employment of resource allocation exist, or if the trappings of self-employment are appealing enough, then entrepreneurs may continue to operate an underperforming firm (Gimeno, et al, 1997). Their work explores the entrepreneurial equivalent to Meyer and Zucker's "permanently failing organizations." (Meyer and Zucker, 1989)

Defining a failure as a "compulsory exit" brought on by bankruptcy or followed by two or more months of unemployment, van Praag (2003) examines the duration of self-employment spells as a measure of success for white U.S. males. This study finds that younger starters have lower survival probabilities than those who initiate self-employment later in life. Interestingly, it appears that men who started their business during a spell of unemployment (the "necessity entrepreneur") fail at higher rates than those who start a firm while employed.

The most extreme definition of failure is bankruptcy, when a firm stumbles badly enough to be unable to cover its debts. As mentioned above, bankruptcy is relatively uncommon. However, it need not be a death sentence. In a large scale study of bankrupt

businesses, Sullivan, Warren and Westbrook (1998) found that 43% of the businesses that had declared bankruptcy continued to operate at least 18 months after filing, but these firms generally tended to be older, more established businesses with a modal age of 10 years. Interestingly, at the time of the authors' follow-up survey, 13% of the founders who liquidated their businesses had already opened another one, and another 11% were in the planning stages of doing so. This reinforces the notion that failure of the firm does not necessarily equal the failure of the individual (Sarasvathy, 2002; Headd, 2003).

Returns to Self Employment

Some work has been done to analyze earning differentials between self-employed workers and traditional wage employees, but the findings are largely contradictory. Rees and Shah (1986), using cross-sectional data from the U.K. also find a positive association between self-employment status and earnings, with self-employed earnings exhibiting much higher variance. They find only a very small difference between the earnings of the two groups.

Borjas and Bronars (1989) couple empirical data with a model for selection into self-employment. They find no meaningful differences in the returns to those engaged in self-employment over wage work, with the exception of black entrepreneurs, who earn a lower return than their white counterparts after controlling for education and other demographic variables. They claim this accounts for the relative lack of black entrepreneurs, as their data indicate that able black workers are usually better off accepting paid employment than going it alone.

Evans and Leighton (1989) improve upon the previous two studies by using a

longitudinal database to capture the dynamic and episodic nature of self-employment.

Using the National Longitudinal Study of Youth (NLSY), they find that self-employed

U.S. males earn slightly more than their peers in traditional business employment, and

that time spent in self-employment does not negatively impact future earnings upon

return to the job market.

However, Hamilton (2000) uses the Survey of Income and Program Participation

(SIPP), a large-scale panel study, to examine the pay differentials between currently self-

employed and wage workers. He finds that most entrepreneurs persist despite lower

initial earnings and sluggish earnings growth compared to their alternative paid

employment wage. He estimates that over 10 years of self-employment, entrepreneurs

will earn 35% less than their predicted income under traditional employment. This study

differs from the previous two in that the author focuses on median earnings, which may

remove the distorting effect of extremely successful entrepreneurs on the mean earnings

differential. Hamilton attributes the persistent discrepancy between the earnings of self-

employed and wage workers to the value of non-pecuniary benefits of self-employment.

He does not address the ultimate impact on wealth, however, which is a key focus of this

project.

Williams (2004) similarly indicates that teens and young adults who are self-

employed have 11-14% lower average weekly earnings and lag in educational attainment

compared to their non-entrepreneurial peers. He cautions that this could be a selection

effect of entry into self-employment. For example, youth entrepreneurship may attract

those unsuited for college or traditional employment in ways not captured by his NLSY

data. He also finds their experience in self-employment is not rewarded in the labor

market upon their re-entry into traditional employment (Williams, 2004), at least at age

27 when the study ends. This seems to contradict Evans and Leighton (1989) who find no

such penalty for returning entrepreneurs.

Wealth Accumulation

Much of the prior work involving the accumulation of wealth does so indirectly

by treating it as the portion of income left unspent on consumption needs. A typical

specification of an individual's wealth can be found in Dynan (1993):

$A_{t+1} = (1+r_i)A_t + Y_t - C_{,t}$

where A_t = wealth at time t, r_i = the after tax rate of return for the individual on his

existing wealth, Y_t = income at time t and C_t = consumption at time t. In Dynan (1993), as

in most such efforts, the author then uses Euler equations to estimate one or more

parameters in either the functions for income or consumption or both, subject to the

above equation as a constraining condition. The parameters of interest include measures

of uncertainty, risk aversion, time preference rates, marginal propensity to consume, and

numerous others. In these studies wealth plays a supporting role by anchoring the

empirical quest for the other variables of interest, but the factors that directly lead to asset

growth are typically not addressed in their own right.

It is also worth noting that much of the labor economics literature devoted to

savings and wealth accumulation does so at the macroeconomic level; that is, the authors

are concerned with questions about aggregate savings and build models that attempt to

reproduce national wealth rather than explain the micro-patterns of household panel data

(c.f. Deaton and Paxson, 2000; Gourinchas and Parker, 2002). As Deaton (1991) points out, microeconomic patterns do not resemble the averages derived from the macroeconomic literature.

However, this doesn't mean that the literature is unhelpful. On the contrary, a number of these studies produce information that applies to the research question under consideration. For example, wealth accumulation for most households begins at near zero or even negative dollars and peaks near retirement, then declines as the consumer faces lower income uncertainty and a higher probability of death (Hubbard, Skinner and Zeldes, 1994). Thus, a quadratic age term will probably be important in modeling household assets over time. As another example, despite wide variation in asset accumulation between households (Quadrini and Rios-Rull, 1997), asset accumulation from year-to-year within the household changes relatively little. This suggests an autoregressive function in the asset growth model.

The nature of wealth accumulation over time is of interest in the present project. Some understanding of the theory behind household wealth will of course be important. Two broad theories of wealth accumulation have gained currency over the years, the second of which is perhaps better described as a derivation of the first.

Life cycle / Permanent income hypothesis

A standard model for the accumulation of wealth is what is termed the "life cycle" hypothesis, often conjoined with its corollary the "permanent income hypothesis" and written in shorthand as LC/PIH. The life cycle theory of wealth, popularized by Franco Modigliani and Richard Brumberg in a series of works, states that consumers save

a portion of their current income in order to finance future consumption because they know that future income will eventually decline due to retirement or disability. The actual amount of savings withheld from current consumption will depend upon the present value of future utility streams, and thus will be sensitive to age, rate of return on assets, expected future income and the discount rate (Ando and Modigliani, 1963). The individual is assumed to attempt to maximize utility over the current and all future periods, and Modigliani and his various co-authors then aggregate the individuals' utility functions in order to approach the problem from a macroeconomic perspective.

Variations of this model exist which assume an infinite lifespan, a known date of death, and/or a desire to bequeath a percentage of wealth to heirs. All variations save the latter are invoked for computational tractability, and provide largely similar solutions for predicted wealth profiles at least until retirement.

Related to the life cycle model, and indeed largely complementary to it, is the Permanent Income Hypothesis first articulated by Milton Friedman. Friedman (1957) distinguishes between permanent and transitory components of both income and consumption. Permanent income reflects a consumer's implicit comparison to others of his age, education, occupation, and so on, and is analogous to one's "expected income" for someone of his stature (Friedman, 1957: 21-22). "Transitory income" is the largely stochastic component that incorporates chance fluctuations in earnings from the perspective of the individual such as illness, seasonal shocks, etc. Friedman tests the proposition that consumption is based on permanent income, not measured (total) income, and finds the PIH's predictions provide a significant improvement over models that assume consumption is a constant function of measured income (Friedman, 1957).

"Buffer stock" saving

In contrast to this more traditional model of saving and wealth accumulation, a second hypothesis has emerged where consumers implicitly set a target wealth-to-permanent income ratio. If wealth falls below that which is required to maintain the ratio, they engage in precautionary savings. If the wealth is above that which is required to maintain the ratio, they will "dissave" or spend some of their accumulated assets (Carroll, 1997). Assets are used to by these so-called buffer stock savers to guard against unexpected shocks to income such as job loss or emergencies. But buffer stock savers also display impatience. They prefer present consumption such that they will adjust consumption patterns upwards to meet gains in income that are reasonably certain to appear on the horizon. This implies a higher discount rate for future income growth than appear in the standard model, or equivalently, shorter horizons for the consumer (Carroll, 1997)[3].

This model, like the others, emphasizes income behavior and thus only considers wealth as what is left over after consumption tastes have been satisfied. However, it provides a plausible and empirically supportable framework that makes less restrictive assumptions about liquidity constraints in that it allows the possibility of borrowing to finance current consumption. It also provides an explanation for a nagging inconsistency in the LC/PIH framework wherein microeconomic household data measured over time often diverges wildly from less frequent macroeconomic measurements of aggregate household consumption (Deaton, 1991; Carroll, 1997).

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[3] Another more disturbing methodological implication for economists is that the standard Euler equation estimation technique commonly used in modeling consumption will fail if consumers are buffer stock savers versus PIH savers (Carroll, 1997: 21-27).

Carroll and Samwick (1995), using the PSID, provide evidence for a strong precautionary motive in household savings by demonstrating that those households with higher income uncertainty maintain higher levels of savings than do households with more reliable income streams. Their work also closes the wide gap between theoretical parameters of risk aversion and time preference predicted under the LC/PIH model and those observed empirically by showing how the lower-than-expected risk aversion and a discount rate of 11% estimated by the data match well with a buffer stock savings framework.

One might wonder if, due to the uncertain nature of returns to entrepreneurship, that the self-employed maintain higher levels of precautionary reserves. The research here is somewhat mixed. Skinner (1988) finds that farmers and the self-employed actually have fewer savings than average over other occupations. He explains this by proposing that these groups are less risk averse, and thus are comfortable with lower levels of savings. However, both Quadrini (2000) and Carroll and Samwick (1995) find the opposite, and note that farmers and the self-employed have significantly higher net wealth than do other occupational groups. Friedman (1957) also finds that entrepreneurs have higher savings rates, a finding he attributes to a higher proportion of their income being classifiable as transitory income. More recently, Bradford (2003) uses the PSID to examine black and white entrepreneurs, and finds that entrepreneurs of both races maintain higher savings rates than comparable workers.

Taking Carroll (1997) and Carroll and Samwick (1995) into consideration, Gourinchas and Parker (2002) make a case that saving behavior changes abruptly between the ages 40 and 45. They provide evidence that precautionary motives dominate

savings in early life, which is consistent with buffer stock saving, while retirement and the desire to bequeath wealth to heirs dominate later stage saving. This latter behavior is more consistent with predictions using the life cycle hypothesis model. Thus, the authors imply that each model works well within its range but neither provides satisfactory predictions over the whole life cycle of the consumer.

It is notable too that a substantial percentage of the U.S. population has virtually no wealth at all (Deaton, 1991), which may be a rational response to means-tested social programs (Hubbard, Skinner and Zeldes, 1995). This group routinely confounds life-cycle hypothesis models which assume that a portion of current income is saved to carry the household over in retirement, since the poorest of the poor rely upon government intervention rather than their own (nonexistent) savings.

In examining the effect of wealth on Dutch labor market transition, Bloemen (2002) finds that unemployed individuals with higher wealth are slightly less likely to become employed the next period. Although he does not speculate as to why this might be, perhaps the wealth subsidizes the individual's search for the optimal job and allows him to eschew taking ill-fitting employment out of necessity. Or, perhaps wealth underwrites more extensive leisure time than is available to those living hand-to-mouth. More interesting for the purposes of this project, Bloemen finds that low-education workers enjoy faster asset growth until age 33, while individuals with higher education tend to enjoy faster asset growth with age after age 33. This finding is well in line with Becker (1975), who reports that unskilled and low-education workers reach their peak earnings and wealth faster than skilled, educated employees who have "lost" years of earnings while in school.

In sum, economists have spent a great deal of energy trying to explain the determinants of wealth at a micro level, and reasons for its distribution at the macro level (e.g. why the U.S. has such a high concentration of wealth in the hands of so few). Despite great strides in econometric modeling, the results have been disappointing to some (Quadrini and Rios-Rull, 1997; Hubbard, Skinner and Zeldes, 1993).

Entrepreneurship and Wealth

As alluded to above, the relationship between entrepreneurship and wealth is not quite as clear cut as one might think. To address post-failure wealth, it is also necessary to consider what wealth will be needed to start a firm in the first place. Economically successful entrepreneurship has a positive effect on wealth accumulation by definition, but a number of scholars have noted that a base level of wealth is necessary to overcome liquidity constraints and start a new business in the first place.

For instance, Evans and Jovanovic (1989) find that absent the requirement to post initial capital, the rate of entry into entrepreneurship would be significantly higher than is observed. They estimate that entrepreneurs can raise no more than about 1.5 times their personal wealth, resulting in chronically underfunded ventures.

Similarly, Holtz-Eakin, Joulfaian and Rosen (1994a and 1994b) use tax return information to test their hypotheses that a) wealth transfers will make one more likely to start a firm and b) entrepreneurs who can find a way to overcome liquidity constraints will outlast those who cannot. They find that receiving an inheritance increases the likelihood of becoming self-employed. They also find that businesses run by entrepreneurs who receive inheritances survive longer than those who do not receive

inheritances and attribute this finding to the greater liquidity afforded by the additional wealth. Branchflower and Oswald (1998), using U.K. data, also find that individuals receiving cash inheritances are more likely to engage in self-employment.

Burke, FitzRoy and Nolan (2002) also lend credence to the positive impact of an inheritance on self-employment, at least among British males in the National Child Development Study, the same dataset as Branchflower and Oswald (1998)[4]. However, they, like Holtz-Eakin et al (1994b), do not seem to consider the possibility that the inheritance of the family business itself may be driving their results.

Based on this criticism and others, Hurst and Lusardi (2004), using PSID data, specifically take aim at the liquidity constraint hypothesis. They use the capital gains in home values as a measure of liquidity and find that:

> "Throughout most of the wealth distribution, there is no discernible relationship between household wealth and the probability of starting a business. Only for households in the top 5 percent of the wealth distribution can a positive relationship be found." (Hurst and Lusardi, 2004: 320)

The authors note that this is true almost regardless whether the entrepreneur is entering a high-capital or low-capital industry. They also take issue with the relation between inheritances and self-employment, finding that "inheritances received in the future predict business formation equally as well as inheritances received in the past. Thus inheritances are a rather poor instrument for changes in household liquidity." (p. 321). They instead speculate that the inheritance is a proxy for some underlying trait that increases the propensity for entrepreneurship, be it financial savvy, entrepreneurial ability or some other driver.

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[4] Burke, FitzRoy and Nolan (2002) go further than just replicating Branchflower and Oswald (1998). They also investigate the relative impact of gender on self-employment selection and success.

Meyer (1990), analyzing the well-known gap between the percentages of black and white entrepreneurs, finds that assets are statistically significant in determining who becomes self-employed among both races, but the magnitude of the relationship is very small. For example, he finds that an increase in $100,000 in an individual's assets only raises his chances of starting a business by 0.077%, less than one tenth of a percent. He argues that relatively few entrepreneurs borrow to begin their businesses, which may cast doubt how binding liquidity constraints really are. Of course, the finding that over 60% of entrepreneurs started with $5,000 or less reflects only a low barrier to starting a business and does not address the success or longevity of such cheaply capitalized ventures.

Failure and its impact on wealth

Only two studies have examined the financial impact of failure on the entrepreneur, both in a rather general fashion. The first is Dennis and Fernald (2001), who find that even businesses that terminate with losses do not necessarily damage the entrepreneur's personal financial standing. Their use of a National Federation of Independent Business (NFIB) telephone survey of 783 households with recent business start or stop activity indicates that only 14% of respondents felt themselves to be worse off financially after a business termination. Only one in five respondents who ran an unprofitable business reported a negative impact to their personal finances. By far the most common result, even for those who closed profitable firms, was no change in the owner's perceived financial status (Dennis and Fernald, 2001). Of course, one limitation of this study is the fact that the author's relied on the entrepreneurs' relative perception of their financial standing rather than directly comparing pre-founding wealth and income

with post-closure wealth and income. The authors also report an anomalous pattern: almost half of those who report that they are better off after launching and closing their business had firms that either lost money or just broke even. Although this result could come from selling mediocre businesses at a profit as a means of closure, the authors note "[n]onetheless, these explanations are not totally satisfactory and leave some doubt that the survey questions were not as exacting as they might have been." (Dennis and Fernald, 2001, pp 79-80)

The only study available which actually gathered financial data from the owners of failed businesses was McNeill and Fullenbaum's (1994) telephone survey of 101 entrepreneurs who declared Chapter 7 bankruptcy[5] in Maryland. This study, commissioned on behalf of the Small Business Administration, reveals many of the difficulties in studying failed entrepreneurs. For example, fully two thirds of those who filed bankruptcy six years ago or less had changed addresses or maintained unlisted numbers by the time of the study, giving the authors working telephone numbers for less than 25% despite dogged attempts to find good numbers (McNeill and Fullenbaum, 1994). This was true even though a fair but unspecified number of the bankruptcy cases were still open! The rapid disappearance of entrepreneurs who have closed their doors is a recurring theme in the attempts to survey them (c.f. Sullivan, Warren and Westbrook, 1998; Bruno, Leidecker and Harder, 1986).

McNeill and Fullenbaum find that:

"The post-ownership financial profile strongly suggests a significant recovery from any financial hardship that the business failure may have imposed on the former business owner. Both from a current

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[5] Chapter 7 refers to the court procedure for closure and liquidation of the business, as opposed to Chapter 11, which grants a "stay" and reorganization of debt to allow the business to continue to operate with the hope of ultimately emerging as a profitable entity.

income and net worth perspective there appears to be significant improvement. Furthermore, since almost 75% of the former owners closed their business over the 1990-1993 period, the recovery process has occurred over a relatively short time frame. **The recovery is not the result of a long-term adjustment**." [emphasis in original, McNeill and Fullenbaum, 1994, pp. 18-19]

However, it is unclear how the authors come to such a firm conclusion, since its basis comes from the respondents' answers to the question "What is your financial status now? A) Are you in a financially worse position than before; B) As well off as before; or C) Are you better off now than before you started your business?" and a noisy measure of assets and liabilities (McNeill and Fullenbaum, 1994, p. App-A-8). Not only is the survey question one of *perception* of financial status, but it does not compare the failed entrepreneurs to other individuals who have not failed. Nor does it address in a precise or meaningful way the opportunity costs paid by attempting the business or take into account the natural accumulation of wealth enjoyed by the median U.S. household over a period of time even as short as a few years (Lupton and Stafford, 2000). The authors collected some court-ordered information on personal and business assets but didn't analyze it rigorously. "A business owner filing for bankruptcy has every incentive to minimize assets and therefore pay out less to creditors. For this reason a decision was made not to put too much emphasis on the asset data and not to calculate a net worth value for the former business owners." (McNeill and Fullenbaum, 1994, p. 7).

Instead, respondents provided the value of their personal assets and liabilities by selecting one of five categories (less than $10,000; $10,000 to $99,000, etc). From this the authors estimated median assets of $152,000 and a median debt of $22,000 for the bankrupt owners. Since the ranges allowed in the survey are quite large, these measures must be regarded with caution.

Summary

The existing literature paints a complex picture of the relationship between entrepreneurship, wealth and failure. While the presence of liquidity constraints on entrepreneurship seems to be accepted by most scholars, there are some nagging indicators that there is more to the story. One alternative explanation that cannot be ruled out by any of the studies reviewed is that nascent entrepreneurs save in preparation for their foray into entrepreneurship, perhaps to protect against the uncertain returns it brings. Under this explanation, the greater assets that seem to be a precondition for entrepreneurship have been consciously gathered in anticipation of the leap into self-employment. Thus, self-employment is not random, nor is it limited to the comparatively wealthy, if a pre-existing decision to become self-employed is the reason for accumulating the additional wealth in the first place. Also, it may be that this additional wealth is not for the business, since important assets can be borrowed, leased or even salvaged. Under many conditions human capital can serve as a substitute for collateral, which lessens the observable up-front cost of entry (Chandler and Hanks, 1998). Instead, the pre-venture wealth gathering may be a manifestation of buffer-stock saving in preparation for the uncertain returns of entrepreneurship. This could explain how those with low human capital can become self-employed on a shoe-string; since their projected permanent income is already low, they need not save much to protect against uncertainty and preserve their future spending power; these are buffer-stock savers with a very small buffer, as it were. For most would-be entrepreneurs it may be that there are indeed liquidity constraints, but that they are largely self-imposed.

Second, the returns to self-employment are not straightforward. Some accounts claim that the self-employed enjoy above-average earnings, while others claim that non-pecuniary benefits lead them to accept lower earnings, especially after distribution-skewing superstars are removed from the sample. Those that do find a substantial difference in favor of the entrepreneur do not differentiate whether the entrepreneur has just become independent or whether she has been in business for a length of time (Hamilton, 2000). This invites the question of whether the prospect of higher income lures workers into entrepreneurship or whether the finding is a result of a survivorship bias after poorly performing entrepreneurs are culled out over time. The examination of the returns to self-employment is made more difficult by the unreliability of self-reported earnings (Aronson, 1991; Blanchflower and Oswald, 1992).

The causes of failure are not well understood, and few attempts have been made to understand it beyond some descriptive surveys. The results are not very illuminating. We often hear that businesses fail because they are undercapitalized. This is probably true in industries that require significant economies of scale in production. However, in some sense this is akin to saying that the patient died because he stopped breathing – running out of money is a symptom of failure, not a cause of it. A more interesting explanation of failure would lead us to ask why the firm didn't master the processes that would achieve profitability in time to stave off death. As Fichman and Levinthal (1991) explain, the initial asset pool buys time for the firm to adapt, learn and capture enough to customers to become profitable. A larger asset pool may allow more time for these processes to evolve (Cooper, Gimeno-Gascon and Woo, 1994), but the firm that doesn't learn will eventually

deplete its financing no matter how long its existence is subsidized by investors and lenders. A host of destroyed dot-coms serve as a reminder of this phenomenon.

Finally, a kaleidoscope of competing or overlapping definitions obscures the discussion of failure rates. Coupled with the lack of information on the impact of failure on the self-employed, we are left with very little to go on when discussing just how risky entrepreneurship really is as an empirical matter. In the rest of this paper I will attempt to address this void in the literature.

3 Hypotheses

The formal hypotheses tested in this dissertation are relatively straightforward, designed to see what the cost of failure, if any, is to a household involved in self-employment. Analyses will be performed to determine the impact on asset growth rate as well as the absolute dollar impact of failure at each measurement period.

Entering self-employment appears to require a substantial amount of capital. As mentioned, one consistent empirical finding in the literature involves the presence of liquidity constraints to entrepreneurship (Branchflower and Oswalt, 1998; Holtz-Eakin, Joulfaian, and Rosen, 1994a and b; Evans and Jovanovic, 1989). This would imply that for the average entrepreneur, overcoming the liquidity constraints involves placing a significant amount of money at risk, and that failure involves losing at least some, if not all of that capital. Therefore, the main hypothesis considered in this paper is the following:

Hypothesis 1: The households of failed entrepreneurs will experience slower asset growth after failure relative to their non-entrepreneurial peers[6] during the same timeframe.

Note that this is not the same as saying that failed entrepreneurs will have lower absolute wealth as their peers. The latter is statement might be considered more controversial, since those who enter self-employment are thought to have higher wealth initially (Hurst and Lusardi, 2004; Evans and Leighton, 1989), possibly obscuring the

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[6] "Peers" in this context refers to households of the same age, education, and minority status. As will be noted later, households where one or both partners are actively self-employed will also be included. These will carry a dummy variable, which is expected to be strongly positive with regard to wealth.

effect of the failure. However, controlling for age, education, and the other known covariates may account for a large percentage of the wealth apparently enjoyed by the emergent self-employed. If the reason that the self-employed tend to enjoy higher average pre-venture wealth is due to their higher-than-average age, education and the higher likelihood of being married, then controlling for these may illuminate the cost of failure in dollar terms. Therefore:

Hypothesis 2: The households of failed entrepreneurs will bear a significant loss of wealth relative to their non-entrepreneurial peers in the period after their failure

Both hypotheses use non-entrepreneurs as a reference group. This is in keeping with my stated goal of making the research useful to those contemplating self-employment, because I frame their salient question as "What is the cost of a failed venture versus remaining in the job market?" Due to the strong cross-sectional relationship observed between current business ownership and wealth, successful entrepreneurs are included in the sample and noted as such with a dummy variable. The primary thrust of the analysis will be comparing the owners of the failed firms to those in traditional employment, but the wealth effect of active (successful) self-employment will be addressed in the results sections. A summary inspection of the data indicates that about 10-12% of those surveyed are involved in self-employment at any given time.

Exploratory data analysis

The two hypotheses above should provide a useful test of the financial impact of failure on the self-employed. However, they alone provide a thin characterization of the phenomenon of entrepreneurial failure. A number of experimental models can be attempted which, while not formally prefaced by theoretical constructions, further detail the nature of failure.

In the spirit of exploratory data analysis (Tukey, 1977), I examine some other models and combinations of variables that may reflect additional insight into the financial effect of failure. The findings that emerge out of these are likely to be interesting, but are to be taken under advisement and suggestive of future work. They will be advanced to investigate possible conditions and modifiers to the presence and extent of entrepreneurial failure. Since this exploratory work is meant to further characterize those living in the aftermath of failure, only the failures themselves will be analyzed; the reference group is set aside. The most developed of these conjectures will be cast as propositions rather than hypotheses to distinguish the two sets of tests, yet still provide some structure to the exploratory research. Some are targets of opportunity based on variables included in the PSID, and can be incorporated into a model relatively easily. Other variables will be included when testing the propositions, but they will be discussed, if interesting, as post-hoc findings rather than tests of a priori relationships. The following sections discuss the propositions to be investigated.

Failure and the serial entrepreneur

Serial entrepreneurs have emerged as a group of interest in studying the processes of start-up (MacMillan, 1986; Sarasvathy and Menon, 2002). Following an entrepreneurial household for a period as long as 17 years allows for the possibility of observing multiple start-up attempts. Although a household which has closed a successful business might seem to have adequate incentive to open another firm based on its positive experience, a household which has failed might be reluctant to risk going through a similar disappointment. Since the scope of this work is limited to the consequences of failure, I will not attempt to address the relative tendency toward serial entrepreneurship between the two groups (successful and unsuccessful). Instead, I return to the previously identified failed households to ask the following question: conditional upon a prior failure, what factors influence the willingness of a household to engage in small business ownership in the future?

The process of starting a firm is believed to have elements that can be learned through experience (Rae, 2002; Minniti and Bygrave, 2001). The fact that someone in the household has tried at least once before to own a business would indicate a certain comfort level with self-employment, even if the results were not spectacular. A number of scholars have indicated that insufficient capitalization is a primary cause of failure (Caves, 1998; Gaskill, Van Auken, and Manning, 1993; Fichman and Levinthal, 1991, among many others). If this is correct, failed entrepreneurs who have learned the dangers of underfunding a venture may seek higher levels of wealth before they can be induced to try again.

Proposition A: Of the households who have failed a business, those with higher wealth will be more likely to try again in the future.

However, given the bitter taste of failure in the past, prospect theory (Khaneman and Tversky, 1979) suggests that a household enjoying a comfortable amount of current income may be reluctant to forgo that income to rejoin the uncertain world of self-employment. This appears to be confirmed by Amit, Muller and Cockburn's (1995) finding that higher opportunity costs result in lower propensities to engage in a new start. Additionally, Rees and Shah (1986) find that employees with higher earnings tend to stay wage-employed rather than switch to entrepreneurship. Thus we might expect that high current income acts as a disincentive to entrepreneurship for those who have failed in the past as well.

Proposition B: Of the households who have failed a business, those with higher current income will be less likely to try again in the future.

Failure and future wealth

Aside from their propensity to enter self-employment again, it is probable that characteristics of the lost businesses or of the entrepreneurs themselves may influence their post-failure path, particularly in terms of wealth accumulation. Unfortunately, since the *raison d'etre* of the PSID is to track household finances rather than information about the business, we are left with scant details about the firm.

One important characteristic of all firms that the PSID notes is whether or not it is/was incorporated. Since incorporation protects the assets of the owner in the event of a business failure, it is reasonable to suspect that owners of failed corporations will retain greater wealth than owners of unincorporated firms. This is expressed in Proposition C:

Proposition C: Of the households which have failed a business, those which operated incorporated firms will be wealthier than those whose firms were unincorporated.

Another potential driver of wealth involves the willingness of the actor to take on risk. The portrayal of the entrepreneur as a risk bearer is almost as old as the term itself (Knight, 1921). A special supplement to the PSID in 1996 measured risk tolerance based on responses to a series of questions probing how likely one would be to accept a new job particular likelihoods of wage increases versus wage declines compared to one's present employment. Based on a first answer, the questioner then posed a new situation with higher (or lower) risk. This process was repeated until a terminal point was reached where the respondents were sorted into 6 risk tolerance categories (Luoh and Stafford, 1998). For example, the lead question reads:

> "Suppose you had a job that guaranteed income for life equal to your current, total income. And that job was your/your family's only source of income. Then you are given the opportunity to take a new and equally good job with a 50-50 chance that it will double your income and spending power. But there is a 50-50 chance it will cut your income and spending power by a third. Would you take the job?"

A "yes" answer would trigger a similar question with an equal probability of a greater cut in spending power, while a no answer would earn a similar question with only a potential loss in purchasing power of 20%, and the process would continue until the respondent was placed in one of the 6 groups.

The literature provides only weak support at best for the notion that entrepreneurs have a higher propensity to take risks, at least risks measured by hypothetical decision tests (Begley and Boyd, 1986; Brockhaus, 1980). Since much of the inquiry into risk tolerance and entrepreneurship took place under the auspices of trait theory, the supposed link between an individual's risk tolerance measured as a static construct against hypothetical rewards and losses, and real-world entrepreneurial decisions in a dynamic, uncertain environment has been criticized (Gartner, 1990; Cartwright, 1971). For that reason I will not address whether a higher risk tolerance leads one to choose to be self-employed, nor will it be incorporated in the tests of the two hypotheses with the mixed sample. However, cognitive psychology (Khaneman and Tversky, 1979) suggests that individuals will risk more to avoid a loss than to secure a gain. If this is the case, then we would be observing the instances where the gamble to save a sliding firm did not pay off and the entrepreneur lost the firm under adverse circumstances. This is because we are only considering the failures; those who gambled and won would presumably still be operating the business or would have sold it at a profit and would not be captured in our sample.

Thus,

Proposition D: Of the households who have failed a business, those with more risk tolerant entrepreneurs will sustain a greater wealth loss upon failure than those households with more risk-averse entrepreneurs.

If such a relationship emerges, it may lay some of the groundwork to extend cognition research from opportunity identification and the decision to become self employed, to the decision to try and stay self-employed in the face of mounting troubles.

These propositions demand different statistical methods, which will be discussed in the following chapter.

4 Methodology

To investigate the hypotheses and propositions introduced in the previous chapter, I draw a sample from the Panel Study of Income Dynamics (PSID). I then apply mixed effect growth curve modeling, a technique ideally suited for longitudinal data, to determine how (or whether) an episode of failed entrepreneurship influences future wealth accumulation. I then conduct complementary analysis with logistic regression and probit analysis where appropriate. The following sections discuss the PSID dataset, the essential features of mixed models, and various definitions and variables employed.

About the PSID Dataset

The data for this project come from the Panel Study of Income Dynamics (PSID), a longitudinal study conducted by the University of Michigan since 1968. The study tracks the financial and health behaviors of almost 8,000 nationally representative families, collecting detailed information about employment, income, savings and investment, and wealth accumulation. The number of individuals tracked during the survey has risen to more than 65,000 as family members have matured and then begun new households which also become included in the PSID (PSID overview, 2004).

The original 1968 sample (termed the "core" sample) was composed of two subsamples. The first subsample was an equal probability sample of households in the continental United States designed to yield about 3,000 interviews. The second subsample consisted of about 2,000 low-income families, intended as a means to study wealth dynamics among poorer Americans. Because of funding considerations in the mid-90s, the oversample of low income families was reduced by about two thirds. Many

of these families were reinstated under an alternative funding source but no longer contribute to the weightings of the core PSID sample. They will be not included in my analysis. The PSID was also enlarged in 1990 with the addition of 2,000 Latino households, but since those families were dropped in 1995 due to lack of funding, they will not be included in my analysis either.

Throughout the history of the PSID, additional supplemental information has been collected from the core families from time to time on topics such as health care arrangements, military combat experience, education, job training and some psychological issues such as achievement motivation and risk tolerance. Most of these were "one-shot" collections but the wealth accumulation supplement collected data in the years 1984, 1989, 1994, 1999, and 2001. This particular information is critical to the conduct of my research.

Suitability of the PSID Data

Obviously, the nature of my research question requires longitudinal data. Lacking the time and resources to conduct my own representative survey over at least 5 years, the PSID provides the fine-grained financial information required to assess the impact of a business failure on a household. The PSID enjoys a relatively low attrition rate and compares favorably to other surveys such as the Survey of Consumer Finances (SCF) and the Census Bureau's Current Population Survey (CPS).

All PSID surveys are administered by telephone, and the Survey Research Center (SRC) at the University of Michigan has achieved remarkably low attrition rates for participants in the study. Yearly response rates vary between 96.9 to 98.5% (PSID Guide,

2004) although over such an extended period of 35+ years even this low attrition rate accumulates. As of 1988, 56.1% of the individuals in original core families remained in the survey, prompting an investigation to determine if there was any evidence of bias in the responses. The study determined that although some variables were correlated with survivorship in the sample, "these variables explain only a negligible proportion of attrition in the PSID" (Becketti et al., 1988; 490-491). High item response rates, i.e. the willingness of the respondent to answer a particular question once contacted, have also been noted in Hurst, et al, 1998.

Several studies have attempted to determine how representative the PSID data is compared to other sources of information on income and wealth. The most common comparison is to the Census Bureau's Current Population Survey (CPS), a large sample cross-sectional survey attained through random digit dialing (RDD) telephone interviews. The CPS asks similar questions regarding wealth and income. The SRC finds that since the mid-to-late 1980's the CPS and PSID estimates of mean income for some subgroups have started to diverge. In particular, the PSID produces a wider range of income and wealth than does the CPS, although the reason for this is unclear. The difference between median incomes calculated from each study differs by only 0-5% during the 1990s (Kim and Stafford, 2000).

The PSID also tracks well with the SCF and a wealth supplement to the Survey of Income and Program Participation (SIPP). Curtin, Juster and Morgan (1988) report that the three provide very comparable results for the majority of the U.S. population, although the SIPP supplement provides the best option for macroeconomic wealth

analysis (Hill, 1992). The same study deemed the PSID superior for item response within

an interview, meaning less need for imputation of missing values.

A testament to the "cleanness" and usefulness of this longitudinal data is the fact

that as of 1999, PSID data has appeared in 234 different journals (PSID introduction,

2004). Due to high demand for the PSID data, the University of Michigan has made life

relatively easy for researchers. The SRC maintains an automated data center that allows

researchers to create custom files consisting of any or all of the hundreds of variables

collected, as well as specify the years in which the researcher is interested. Most

importantly for my analysis, the family-level and individual level files are merged,

allowing for meaningful (and error-free) cross references between family units and

individual respondents. For example, the value of a husband and wife's investment

portfolio is a family-level construct, but is reported by an individual. I am primarily

interested in self-employed status, an individual-level notion, but the merging of the two

separate data collections allows me to examine a much larger and more useful set of

variables including my dependent variable of household wealth.

Unit of analysis

The unit of analysis will be the household, defined as the head of household and

spouse/cohabitating partner, if any. The wealth of dependent children, unlikely to be

substantial in any case, will not be included in household wealth. For simplicity of

analysis and interpretation, wealth of adult members of the household other than the head

and spouse/partner will be similarly excluded.

The PSID reports income and self-employment status for both members of most dual person households. This enables some flexibility in specifying certain variables. For example, if we are interested in how (or if) the gender of the entrepreneur matters, we can differentiate between male, female and jointly operated businesses while keeping the measurement of household wealth intact. This also means that we can assess the opportunity cost incurred with the self-employment decision by examining the proprietor's individual income prior to launch rather than the inconclusive joint household income.

Mixed Models

To analyze the impact of business failure on the entrepreneur's personal wealth, I use a set of techniques referred to as growth curve modeling (GCM). GCM has proven useful in research involving measuring *changes* in some continuous variable (often test scores in education or psychology, but wealth in the present case) *over time* with *the same subjects*. More specifically, I use a regression procedure known as mixed effects modeling applied to longitudinal PSID data, which captures family wealth and a number of other characteristics of interest to wealth accumulation. While growth curve modeling and mixed effects models are becoming increasingly popular in other fields such as education (Singer, 1998), psychology (Ferrer, Hamagami and McArdle, 2004) and medicine (Heo, et al. 2003), their use in management and entrepreneurship are still quite novel.

Mixed effect modeling works in principle by first estimating regression parameters in manner similar to the familiar Ordinary Least Squares (OLS) regression. A general form equation for the first stage would be:

$Y_i = Z_i \beta_i + \varepsilon_i$ where

Y_i is a vector of outcome variables for a given individual (wealth, in this analysis)

Z_i is a (n x q) matrix of measured covariates (education, age, etc)

β_i is a q dimensional vector composed of each subject's unknown individual regression coefficient (wealth accumulation slope) and

ε_i is a vector of residual (error) components

The difference between a mixed model approach and OLS is that the traditional OLS method assumes that all subjects possessing the same level of each covariate contained in Z are affected in the same way, and that β is estimated across all subjects rather than as a vector of individual slopes, and is thus common to all. For example, in OLS if we assume that each year of education contributes β_{ed} amount to accumulated wealth at time t then this model provides a satisfactory way to represent the effect of education on wealth. The parameter β_{ed} would be referred to as a "fixed" effect under this method. However, in mixed effects modeling one assumes that one or more of the covariates impact subjects in a statistically significant idiosyncratic way. That is, we have a theoretical reason to believe that there exists a subject-specific component of a year of education on wealth, represented by $b_{i,ed}$, which is added to the general β taken in the aggregate over all subjects to help determine our subject-specific parameter β_{ed}.

The second stage of a mixed-effects model, then, takes the form

$\beta_i = K_i\beta + b_i$ where

K$_i$ is q x p matrix of known covariates

β is a p-dimensional vector of overall unknown regression parameters and

b$_i$ is the idiosyncratic component, assumed to be independent with a mean

vector of zero (Verbeke and Molenberghs, 2000)

which through substitution yield the functional form of the mixed model equation:

$$Y_{ij} = X_{ij}\,\beta + Z_{ij}\,b_i + \varepsilon_{ij}$$

Where $X_{ij} = Z_{ij}K_{ij}$, a product matrix of the covariates, subscript i denotes the subject

family and subscript j denotes the year of observation.

This general linear mixed model assumes that there are some fixed effects β

which hold for the population, and some random effects b$_i$ which are unique to the

subject. If all slopes and intercepts are considered fixed (i.e. no idiosyncratic components

are permitted), then the result will be identical to the simpler OLS solution. As a practical

matter, some experimentation guided by theory is usually necessary to determine which

effects should be fixed and which should vary. It may be the case that although the

influence of certain variables on wealth do indeed exhibit subject-specific idiosyncrasies,

these idiosyncrasies are too small to be meaningful and thus should be abandoned in

favor of the simpler fixed effect.

Mixed models have proven flexible and robust when dealing with longitudinal

datasets that are unbalanced (i.e. not all subjects have the same number of repeated

measures) and those that have missing data (Verbeke and Molenberghs, 2000). This is

because the software produces iterative estimations for each stage based on results from the other stage in order to determine the best fitting parameter values. Unlike a literal application of the two stage model described above, a missing value does not prove fatal to the estimation; all available data is used, rather than the data for only complete subjects. Of course, the more complete the dataset, the better the estimations and the better the model fit (Heo, et al, 2003). It is also worth noting that computationally, mixed effects growth curve models are identical to hierarchical linear modeling (HLM), where time is treated as a level of analysis much as school effects, family effects, or treatment group assignment would be under HLM (Singer, 1998).

These computational conveniences aside, the use of mixed models in evaluating the determinants of wealth makes intuitive sense. As Quadrini and Rios Rull (1997) conclude in their discussion of various wealth models "Most of these models [reviewed in this article] are based on uninsurable idiosyncratic risks to households' earnings that introduce precautionary savings as the main mechanism that generate differences in asset holdings." This implies that even among households of equal education, earnings, age and so on, we expect factors unique to the household to influence its precautionary savings over time, and thus wealth accumulation.

Likewise, some precedence in the wealth and savings literature exists for the use of mixed modeling. Kazarosian (1997) allows for subject-specific intercepts of the age/income profiles (i.e. random intercept β_0 using this paper's notation) after controlling for observable personal characteristics. Although he finds these subject-specific intercepts to be only marginally different than the fixed effect, they are nonetheless statistically significant.

The main analysis, then, will concentrate on finding a) differences in the rate of wealth accumulation between failed entrepreneurs and their peers, which relates to Hypothesis 1, and b) the dollar impact of entrepreneurial failure, which relates to Hypothesis 2. The former will be represented by the interaction effect between dummy variable(s) $fail_{it}$ which indicates whether or not household i suffered a business failure at time t, and time variables. The latter will be represented by the coefficient(s) of $fail_{it}$ which, when properly interpreted, yields the dollar impact of failure.

Entrepreneurial failure defined

As mentioned earlier, previous studies have defined failure in different ways depending upon the objectives of the authors and the data source available. One commonality among them is the notion that as long as a business remains open, the entrepreneur is not deemed a failure (the lone exception being Gimeno, et al, 1997). I take the view, similar to Hamilton (2000), that as long as a business remains open, it is indeed difficult to consider it a failure even if its poor performance offers less than does the prospects of any alternative employment. Therefore, for the purposes of this study, only entrepreneurs who have closed their businesses may candidates for having failed.

However, it is clearly the case that not all closures are failures, as evidenced by the work of Headd (2003), Bates (2002), and Dennis and Fernald (2001). Some firms are sold at a profit, others sold so that the owner can retire, and still others are sold or abandoned because the founder has identified a better opportunity. Even in cases where the firm did poorly, it still may be regarded as a personal success for the founder if self-employment satisfied some non-pecuniary interests or allowed him to achieve a greater

non-financial goal. However, since I am examining the financial aspects of business

failure, my definition of failure follows economic lines. *For this study, failure is the*

cessation of self-employment that results in a) business losses, and/or b) the individual

forgoing a higher income that would have been available had the individual remained in

wage employment rather than founding the closed enterprise, and/or c) the individual

being unemployed . Operationally speaking, if the business is closed, and the

entrepreneur re-enters the workforce at a lower wage (adjusted for inflation) than she

earned before becoming self-employed, she will be considered a failed entrepreneur[7].

Hence, my definition relies on the concept of opportunity costs to identify whether or not

the business was an economic failure. Figure One below illustrates the process of

identifying the owners of failed businesses from the PSID.

Failure Operationalized
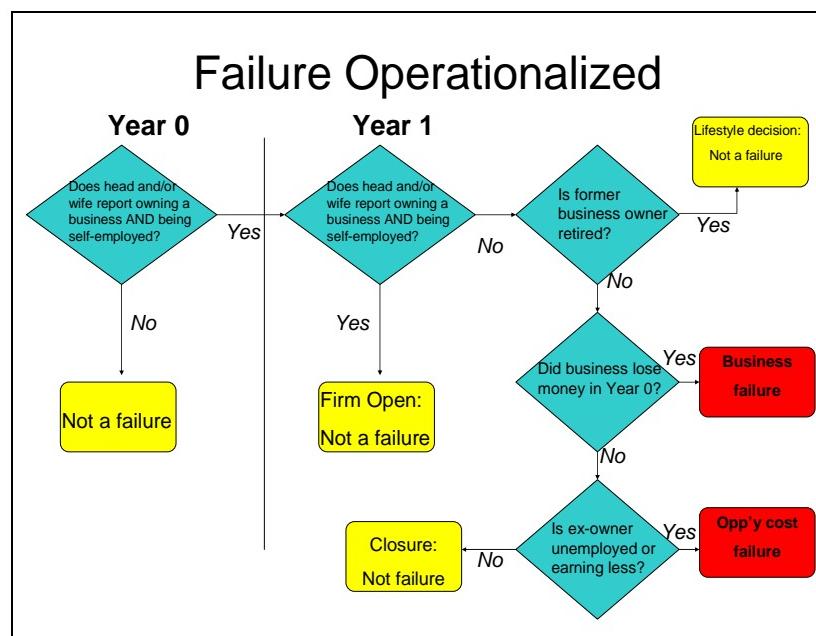
FIGURE ONE

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[7] The use of preceding year's wages to estimate opportunity costs follows Amit, Muller and Cockburn, 1995.

By this definition and operationalization, I do not mean to undervalue the importance of non-pecuniary motivations for business foundings. Whether a business, open or closed, should be considered a failure is properly regarded as a subjective judgment. However, since my interest is in the effect of business failure on monetary wealth, these considerations must be set aside for the time being. By treating businesses that have closed with losses or incurred an opportunity cost for the entrepreneur as failures, I have set up a stringent definition that frames the issue in economic terms and provides a worst-case look at the subsequent financial impact on the founder.

It is also worth noting that despite the fact I will refer to the entrepreneur as a failure when the demise of her business meets the qualification above, this is merely a semantic convenience. It is not an endorsement of the idea that an entrepreneur has necessarily failed when it is her business that has failed. The entrepreneur, of course, may many potential successes awaiting expression in the future. Firm failure may be a 0/1 variable, but an entrepreneur may not necessarily be judged a failure until the final reckoning (Sarasvathy and Menon, 2002).

Dependent variable

To address the financial impact of business failure on the entrepreneur, one can choose between two alternative conceptions of what we mean by "financial impact": the growth in yearly earnings or the growth in accumulated wealth. The first method involves analyzing the subsequent yearly earnings of the entrepreneur in his/her post-failure

employment, and observing the difference in the growth in employment income between the failed entrepreneur and workers who have stayed in traditional employment. Labor economists have analyzed income progressions over individuals' careers to generate age/income profiles under a variety of assumptions (Gourinchas and Parker, 2002).

One major problem with using income/earnings to measure financial success is that entrepreneurs typically have an incentive to underreport income for tax purposes. Accounts of such underreporting are common (Aronson, 1991; Branchflower and Oswald, 1992). It has even been suggested that one motivation for entrepreneurship is a desire to reduce one's tax burden (Gordon, 1998; Rees and Shah, 1986: 99). However, since except for the estate tax the U.S. government does not yet tax accumulated wealth, there is little incentive to underreport wealth figures outside of bankruptcy proceedings.

Another difficulty with using income as a measure of financial standing is that the failed entrepreneur incurs a job change by definition. As he goes from self-employment to wage work (or unemployment) this is likely to induce large variation in income. Thus, it becomes difficult to separate the impact of the job change from the impact of the failure. At least one study finds that entrepreneurs tend to switch jobs more frequently than career wage workers (Evans and Leighton, 1989), indicating that this measurement problem may arise repeatedly over the course of a longitudinal study.

Another major problem with income is that it neglects any investment made in the failed business. Entrepreneurs may accept lower wages in order to plow their earnings back into the fledgling business. When the ex-entrepreneur leaves self employment, any capital invested net of debts will be returned to her. Unless bankruptcy consumes the entire investment, which seems to be rare, the income during the spell of self-

employment will be understated by the amount infused back into the business. Entrepreneurs who accept a lower salary in order to reinvest earnings into the enterprise will be unfairly punished if current income is used to evaluate financial standing.

Income-age profiles are also highly influenced by occupation. For example, professionals enjoy a much steeper slope in their earnings profiles relative to craftsmen, but are "delayed" in their start due to an extensive period in school at the beginning of their careers (Carroll, 1997: 34).

A final problem with using labor earnings when measuring the impact of entrepreneurial failure is that it tends to distort the impact of human capital investment activities, unless the researcher has data that extends until retirement. For example, the individual who leaves self-employment to return to school suffers a penalty because his income levels collapse for 2-4 years during this time, but the payback period for this investment is likely to extend 20 years or more (Becker, 1975). Upon the completion of school, the individual enjoys a large spike in income percentage-wise as he goes from making very little to resuming living wages. This spike after graduation threatens to overwhelm the presumably more subtle effects under investigation.

Using net wealth as a measure of finances suffers its own drawbacks. For instance, wealth is highly dependent upon the consumption preferences of the household, a variable that cannot be easily observed. In fact, under both the LC/PIH and buffer stock saving models, consumers overwhelmingly adjust their consumption levels to conform to income, with some allotment made for precautionary savings (Hubbard, Skinner and Zeldes, 1993). They tend to spend their raises unless they have reason to believe that the raises are only temporary. Labor economists call this long-term empirical pattern the

"consumption/income parallel." An individual who spends every dollar of his pay raises will not show a growth in savings and investments commensurate with his growing earnings. However, this is mitigated somewhat by the fact that much of consumers' increased spending power is typically plowed back into big-ticket durable goods that will reappear in a broad measure of wealth: housing and automobiles are the most notable examples. Also, the problem of elevating consumption to match one's income is a phenomenon common to both entrepreneurs and those in traditional employment. Without some compelling rationale as to why entrepreneurs and non-entrepreneurs differ as to their marginal propensity to consume, the argument cannot count uniquely against either.

In this dissertation, wealth is represented by the sum of household assets minus all outstanding debt. The PSID tracks the values for real estate (including home equity), investments (including stocks, mutual funds, and annuities), checking accounts, and automobiles, as well as outstanding loans and credit card debt. These measures provide a fairly fine-grained measure of household wealth updated every five years from 1984 to 1999, with another measure in 2001. Thus, for business failures in 1984 I will have up to five repeated measures of asset value, while for those who failed in 1994 I will have up to three[8]. Wealth will be represented in the model as a logarithmic function to help normalize its distribution. Coefficients will be transformed back to dollar values where appropriate to facilitate discussion of the impacts of the variables on wealth.

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[8] The fact that the final measurement time is only two years while all others are five need not present any problems for the regression. Unlike standard ANOVA calculations, which assume that all time intervals are the same length, the SAS 8.2 PROC MIXED command allows for differing time lengths by specifying time as both a classification variable and a continuous variable (Verbeke and Molenberghs, 1997).

All measures of wealth will be adjusted to 2001 dollars using Consumer Price

Indices (CPI). This will facilitate comparisons in asset levels across cohorts.

How could failure NOT lead to losses?

Note that the definition of failure as closure with losses may appear to stack the

deck for a finding that supports Hypothesis 2, which contends that failed entrepreneurs

will display reduced wealth compared to their non-entrepreneurial peers upon closure of

the defunct firm. Since the proprietor's business has sustained losses leading to closure,

does this not automatically inflict economic losses upon him? Possibly, but not

necessarily. To the extent that the entrepreneur has distributed the financial risk of his

business on to others, only a portion of the business losses may translate to personal

losses. In the case of Chapter 7 bankruptcy protection, the fraction may be quite small.

Also, failure need not mean a complete loss of all invested capital. The entrepreneur may

recoup much of her investment despite the difficulties encountered by the firm if she

pulls the plug in time. Therefore, although it would certainly be no surprise to see a

wealth impact to failure because of the definition used, the *magnitude* of the loss will still

be of great interest. Small losses might imply that entrepreneurship may not be quite the

risky endeavor it is made out to be. Such a finding would seem to be good news for those

contemplating self-employment.

Secondly, a key parameter of interest throughout the analysis will be the

interaction effects of the time measures with the failed/not failed dummy variable and the

existence of any lagging effect. The results of these tests should show whether failed

entrepreneurs indeed suffered an impact, which we might expect, but also *how long that*

effect lasted. It is plausible that the statistical tests could reveal a significant negative impact to wealth immediately after closure, which wouldn't seem too surprising, but that the effect disappears at the next measurement. This would suggest that the recovery time for the failed entrepreneur is less than 5 years.

Independent variables

Not surprisingly, households with high levels of human capital also accumulate more wealth, and generally at a faster pace than those households lacking in education and job skills. Therefore, variables that measure human capital inputs will also be included to control for asset growth that is attributable not to whether a self-employed individual has failed, but to demographics and training. The main variables to be included in the hypothesis test follow.

Since the number of entrepreneurs who fit my stringent definition of failure is not exceedingly large, I will be taking some care in my selection of control variables in order to preserve the power of the statistical test. My question is about *differences* between the profiles of two classes of households. In order to be included in the analysis, a concept must affect BOTH 1) the accumulation of household wealth according to economics literature AND 2) the propensity to engage in entrepreneurship, in order to better account for the selection bias effects in the model where those with more assets are presumed to be more likely to enter self-employment.

As an example of a concept that satisfies the first condition, but not the second take the health of the individual. Poor health can be shown to adversely affect an individual's income and wealth profile due to lost time at work, medical bills,

prescription costs and the like (Wu, 2003; Buron, Haveman, Hill, and Wolfe, 1995).

However, no demonstrable link has surfaced between health and self-employment.

Statistically speaking, we can expect the effects of poor health to affect the wealth of

entrepreneurs and non-entrepreneurs relatively equally and therefore we need not control

for it. One could make a plausible argument that poor health would affect the

entrepreneur more because of his/her outsized importance to the fledgling business, a

lower likelihood of health care insurance, etc, but without a solid theoretical or empirical

link this concept is best left aside.

A concept that satisfies the second condition but not the first is that of parental

entrepreneurship. Several researchers have noticed that entrepreneurs, particularly

successful ones, are more likely to have parents who were self-employed (Duchesneau

and Gartner, 1990; Carroll and Mosakowski, 1987), but there is no evidence that this

directly impacts household wealth.

For the hypothesis testing portion of the dissertation, only those variables which

satisfy both inclusion conditions and can be culled from the PSID are included. These

restrictions will be loosened for the exploratory section of the dissertation.

Essential variables to be included in the model include human capital

considerations such as age and education, and other demographic factors such as minority

status and marital status. Current small business ownership will also be included in the

analysis.

Age: Nearly all researchers interested in earnings and wealth accumulation pay particular

attention to the age of the worker as a proxy for skill and experience (Becker, 1975; Hurst

and Lusardi, 2004; Bloemen, 2002; Carroll and Samwick, 1996). Indeed, since it represents the horizontal axis of an income or earnings profile, it is hard to ignore. Additionally, empirical labor economics literature shows the existence a quadratic component to the shape of both earnings and wealth profiles (Kazarosian, 1997). The general shape of the wealth curve is that of an upward slope approaching the peak earnings years in the late 30s to early 50s, and a continued rise in assets though at a slower pace as the individual approaches retirement. Therefore, my investigation includes both a linear (age) and quadratic (age^2) component in all tests.

The entrepreneurship literature also shows that age is an important variable in identifying entrepreneurs (Aronson, 1991; Shane, 1996). For example, Evans and Leighton (1989) find that the likelihood of entering self employment increases after the first 20 years of wage work. Theorists believe this trend may occur because of the time required to build a credible set of skills, gain enough knowledge of an industry to go it alone, or simply that it may take a while to hit upon a viable business idea (Cooper, Woo, and Dunkelberg, 1989). For married/cohabitating couples, the average age is taken. Because age will usually advance in lockstep with the variables denoting the year of measurement, it may be necessary to instead to freeze this variable at the first measurement of age available to prevent multicollinearity problems. In either case, age or "first age" will be centered to further reduce multicollinearity and enhance interpretation of the model's output[9] (Cohen, Cohen, West and Aiken, 2004).

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[9] Centering age at the grand mean allows the researcher to insert a 0 value in the equation for age when he/she is interesting in determining the marginal effect of a unit increase in other variables, knowing that the value for age coefficient is for someone at the mean age of the sample. A model with an uncentered age provides the coefficient for when age=0, which is obviously nonsensical. The researcher is then forced to also specify a value for age in order to have the dependent variable take on a meaningful score. Centering is also essential when introducing polynomial equations into the model (Cohen, Cohen, West and Aiken, 2003).

Education: Becker's (1975) landmark study of the effect of education and training on workers' earnings demonstrates the importance of this variable fairly conclusively, so much so that it seems to be common knowledge that higher education leads to greater income on average. Both Aronson (1991) and Hamilton (2000) note that higher education levels are associated with self-employment. In keeping with the research of other scholars using the PSID, I include "years of education" as a measure of worker schooling[10]. For married/cohabitating couples, I use the average years of education. This value is also centered in the model for the same reasons discussed above.

Marital status: Marital status has a profound impact on the accumulation of wealth. Married couples maintain a wealth-to-income ratio of 4, while singles with dependents hover around 2.5 (Diaz-Gimenez, Quadrini, and Rios-Rull, 1997, cited in Quadrini and Rios-Rull, 1997). Divorce often results in severe setbacks, particularly for women with children (Johnson and Skinner, 1986).

Likewise, studies have found that entrepreneurs are more likely than non-entrepreneurs to be married. Although being married seems to reduce the chances of entering self-employment, those already self-employed (the subjects of this study) are more likely to be married (Hamilton, 2000; Evans and Leighton, 1989).

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[10] A common complaint about the robust relationship between education and wealth is that we do not know whether it is a causal relationship or merely a mask for other variables (Angrist and Krueger, 1999: p. 1284) since well-schooled individuals also frequently come from wealthier families. Becker (1975) for example, entertains the possibility that education is a proxy for an underlying raw "ability" and cites a long history of debate over the question. For want of a decisive finding in the labor economics literature, I will remain agnostic as to whether education is a measure of ability or merely a correlate of it.

Race: Despite years of advances in civil rights, even the most recent studies indicate that minorities still lag behind whites in wealth accumulation (Associated Press, 2004). Once other influences (most notably education) are accounted for, the effect of minority status is diminished but still sizable, especially for African-American households (Blau and Graham, 1990).

The literature also shows a puzzling absence of African-American entrepreneurs (Fairlie, 1999; Aronson, 1991), attributed to low rates of entry and high rates of exit relative to their white counterparts (Fairlie, 1999). In fact, a preliminary inspection of the PSID reveals very few minority-owned failures in a given year. Unfortunately, this will probably make it difficult to address the question of whether minority owners suffer greater setbacks due to business failure than do whites. Due to the paucity of non-whites in the failure sample, they will be grouped together under the dummy variable "minority" rather than the preferred treatment as a class variable where each race could receive its own coefficient.

Small Business Ownership: Current small business ownership has consistently been associated with higher wealth in cross-sectional surveys (U.S. Census, 1999; Diaz-Gimenez, Quadrini, and Rios-Rull, 1997). It will also be important to tag current business owners in order to get a sense of the differences between the households with failed businesses and those whose firms are still operating. Specification of this variable will also be critical in testing Proposition B, which relates current income of the failed entrepreneur to her propensity to try again. Unless the failed entrepreneur runs multiple businesses, which is quite rare, the failure dummy and the small business ownership

(SBO) dummy should be mutually exclusive at any given time. Propositions A and B investigate serial entrepreneurship among the failed households, and any SBO indicators *after* the year they failed a business will identify the family as a repeat firm-owner.

All independent variables are re-measured at each time point. One very useful feature of the PROC MIXED command used to perform the mixed modeling is that it allows for time-varying covariates. Thus, if a household goes through a divorce, marries someone with higher or lower education, starts a business, etc, it can be captured dynamically in the model with all of its requisite wealth effects. This allows for more exacting estimates of the coefficients which can change over time.

Variables left out

No model can include everything of possible interest, whether because of data availability or model overspecification, and this analysis is no different. Three notable omissions in the main hypothesis testing exist.

Occupation: Although wealth profiles for different occupations tend to be noticeably different (Carroll, 1997), the three-digit Census of Population codes used by the PSID provide an unworkable number of job categories. It is possible, of course, to narrow down the occupation categories to a manageable size by grouping the occupations that are similar in some regard. Doing this invites questions about the validity of the groupings. The dozen "preselected" groupings provided by the PSID are of varied breadth and provide little information of interest. For example, professional and technical

workers are combined in one category, yet "transportation equipment operative" and "private household workers" each earns its own category. It is also possible to group by two-digit identifiers instead of the full three digits. When this is done, airline pilots and embalmers share the same two-digit identifier. Jewelers, inspectors and locomotive engineers share another. I do not believe omitting occupation will substantially impact the results, since occupations tend to be a consequence of educational achievement and are therefore correlated with schooling (Angrist and Krueger, 1999: 1292). Therefore, I would expect that some of the variation introduced by occupation will be captured in the measurement of education.

However, I will investigate two occupational and industrial groupings categories in the exploratory section of the analysis. It may be useful to see if those entrepreneurs whose business involved manufacturing bear a higher cost of failure than do service sector entrepreneurs due to the higher capital outlay required. Since at least one other study consulted did not find a relationship between industry and capital structure and financing levels (Cassar, 2004), I do not expect this variable to materially affect the analysis.

I also introduce a grouping of those industries and occupations of the failed entrepreneurs that could reasonably be termed as "high-tech." This includes those in computer and communication-related fields, research and testing firms, engineering, pharmaceuticals, and those entrepreneurs who identified their occupation as "scientist." This group will also be regressed to determine if their involvement with technology is associated with higher or lower personal wealth at the time of business failure.

Macroeconomic factors: Interest rates are an essential element in any economist's model of wealth accumulation. However, since my intent is to compare the asset growth of failed entrepreneurs versus others rather than perform a high fidelity re-creation of macroeconomic wealth profiles, I do not intend to explicitly account for interest rates, unemployment rates, and so on. Lacking a rationale as to how these factors would affect the two groups differently, I have chosen to ignore them for the present.

Instead, as mentioned I do plan to adjust all nominal dollars to year 2001 dollars by adjusting for growth in the CPI. Although I do this is to make wealth measures over 15 years of data more comparable, it can also serve as a crude proxy for varied interest rates given the tight connection between the two.

Real estate values: According to popular press accounts, real estate is the single biggest investment for most families in the U.S., and would therefore contribute a great deal to net worth. Fluctuating real estate could introduce quite a bit of variance to models of wealth. However, since there is no a priori reason to assume that real estate holdings differ appreciably between the self-employed and those who work for others after controlling for age, education and marital status, it will not be addressed in this paper[11].

Other Methods

While the mixed model approach detailed earlier in the chapter is the most important method I will use for Hypotheses 1 and 2, it will not be the only one. In order

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[11] In fact, running the final model for the growth curve analysis but excluding net home values from the assets produces results that are not materially different than the results with real estate equity included. All of the same variables achieve statistical significance although the values of the coefficients change slightly.

to test the four propositions, I will also employ logistic regression and probit regression, which are useful for dependent variables with dichotomous outcomes. These methods will be described briefly in the section of the next chapter in which they are used.

Issues

Despite the convenience of the mixed model approach in dealing with missing data and varied number of repeated measures, substantial database clean-up and operational issues remain. For example, once a respondent has reported his or her education level, this question is often not asked again. If this individual appears during the time frame in which I am interested (1984-1999), steps must be taken to retrieve his/her education level from earlier waves of the survey or education will be treated as a missing variable with all the attendant complications missing data poses. For most waves, the PSID does this automatically, but not always.

Another significant cleaning issue involves the timing of the self-employed failures. Those who failed in 1984 will (if they have not dropped out) have five wealth measurements, while those who failed in 1999 will only have two: the initial measurement and a post-failure measurement at 2001. Although this poses no problem for the mixed model analysis of the full sample once all dollars are expressed in 2001 terms, the failure-only analyses necessary for the Propositions must be handled differently. For the latter, substantial recoding will likely be necessary to align the failures such that they constitute a synthetic cohort where Time 1 measures the point immediately after failure for all of them, regardless of whether they actually closed in 1984 or 1994. As a result, the failure-only analyses will have the full set of failures for

one measurement, fewer with two measurements, and so on due either to drop out or right censoring.

Finally, for simplicity of analysis I plan to stop wealth measurements at retirement from the workforce (as reported by the respondents, not tied to any particular age) and consider the subject to have left the sample at that point. One of the biggest challenges that econometric wealth accumulation models face is forecasting income after retirement (Bernheim, Skinner and Weinberg, 1997). Some households seem to continue to accumulate assets even when theory says that they should be dissaving en route to the grave, perhaps out of a desire to bequeath the family nest-egg to heirs. Therefore I will truncate the analysis of wealth at retirement to keep the results interpretable for the working population. It seems unlikely that early entrepreneurial failures should haunt households into their retirement years. If my analysis finds significant wealth penalties persisting for the 1984 failure cohort into the year 1999 I may revise this assumption.

Anticipated limitations

A few notable limitations inhere in this analysis. For example, the failure profile of those induced into self-employment by the existence of a valuable opportunity (opportunity entrepreneurs) and those who were forced into self-employment by the loss of a job (necessity entrepreneurs) may be very different. Hypothetically, it would be possible to flag necessity entrepreneurs as those whose self-employment was preceded by a firing and/or a spell of unemployment. However, only in very recent waves of the PSID were the reasons for job changes collected, and since the respondents are only interviewed once per year we could very easily miss the spell of unemployment that led

to the necessity entrepreneur's decision. The distinction between these two populations, if one exists, will remain cloudy until a more exacting study is conducted.

Second, dual-income families in which one partner is self-employed present a challenge. There are many such households in the PSID. It is possible that the earnings of the traditionally employed spouse may counterbalance the entrepreneur's failure penalty and confound attempts at measuring the impact of failure. However, since it is impossible to determine what percentage of wealth can be attributed to which partner and theoretically unsound to simply divide wealth in half, no obvious solution exists. If married entrepreneurs benefit from this arrangement relative to single entrepreneurs, we would expect to see a significant interaction term between the two dummy variables, but without very large sample sizes, interactions between dummies can be hard to come by.

5 Results

Broadly speaking, the hypotheses proposed in Chapter 3 require two types of analyses. Questions involving comparisons between households with failed businesses and a representative peer group of traditionally employed families (the reference group) can be answered by modeling changes in wealth over time and asking how group membership affects wealth accumulation in the presence of covariates. The propositions, which are aimed at characterizing the sample of failures require a variety of methods, but analysis is restricted to the 118 households that qualify as having closed an unsuccessful business. I address the comparison of failures to reference group households first, and then move to the characterization of the failure sample.

Table One below shows sample statistics for Year One of the data, comprised of 115 families with a failed firm and 393 wage-employed households. This table does not include information on three outlier families (all failed business owners) with wealth above $10M, discussed later in the chapter.

Descriptive Statistics and Correlations

Variables	Mean	Std Dev	Min	Max	1	2	3	4	5	6	7
1. Wealth(a)	105,136	293,472	-42,000	4.636	1.000						
2. Age	35.912	12.214	18	87	0.207**	1.000					
3. Minority	0.362	0.481	0	1	-0.163**	-0.107*	1.000				
4. Married	0.585	0.493	0	1	0.188**	0.042	-0.195**	1.000			
5. Education	12.611	2.633	1	17	0.163**	-0.195**	-0.291**	0.150**	1.000		
6. Biz owner	0.085	0.279	0	1	0.154**	0.057	-0.089	0.081	0.051	1.000	
7. Failure	0.228	0.420	0	1	0.219**	0.191**	-0.123*	0.156**	0.083	0.031	1.000

*$p<0.05$
**$p<0.01$

(a) Wealth presented in this table is raw wealth, Wealth is logarithmically transformed in the model such that $W_{model} = \ln(W_{raw} + 370035)$, with the additive term included to prevent negative logs.

As noted earlier, raw wealth is highly skewed, as evidenced by the distance between the average wealth of $105,136 and the median wealth of $22,420. All models use the transformed wealth figure as indicated in note (a) of the table. The transformation reduced the difference between the median and mean wealth to less than $20,000. This is done to better satisfy the assumptions of normality required for the statistical methods I used.

The Wealth of Failed Entrepreneurs Relative to Traditional Labor Market Employees and Successful Self-Employed Business Owners

Graphically, the age-wealth profiles for the two groups (failed business owners and all others) show no astonishing differences between them. There does appear to be greater variance in wealth among the failures, which is confirmed in the by-group summary statistics. Additionally, the failure group appears to contain younger workers than the reference group. Both groups are dominated by those with a net worth of less than $200,000. Figures Two and Three below show the age-wealth profiles for randomly selected families from the reference group and failures, respectively[12], but note that for the failures, the measurements do not necessarily start at the time of closure. Single wealth points indicate that either the preceding or following measurement is off the graph.

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[12] Showing the full sample is quite noisy, and placing both groups on a single graph and color-coding for group membership did not prove informative.

## Age—Wealth Profiles, Non—Failures

Randomly selected families
failid=0
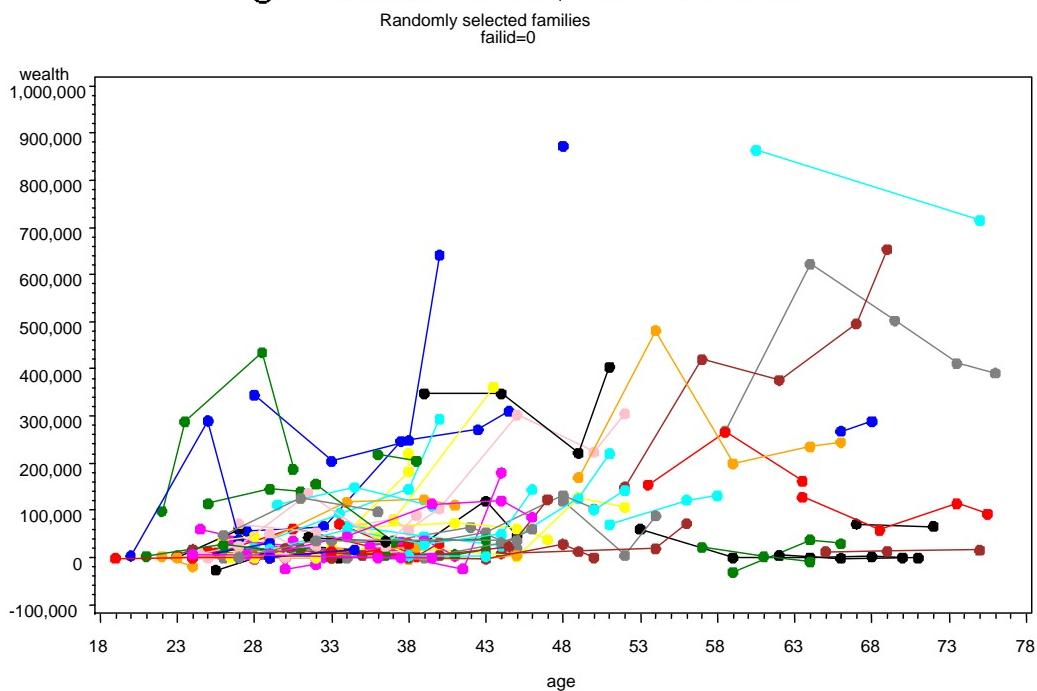
FIGURE TWO

Age—Wealth Profiles, Failures

Randomly selected families
failid=1
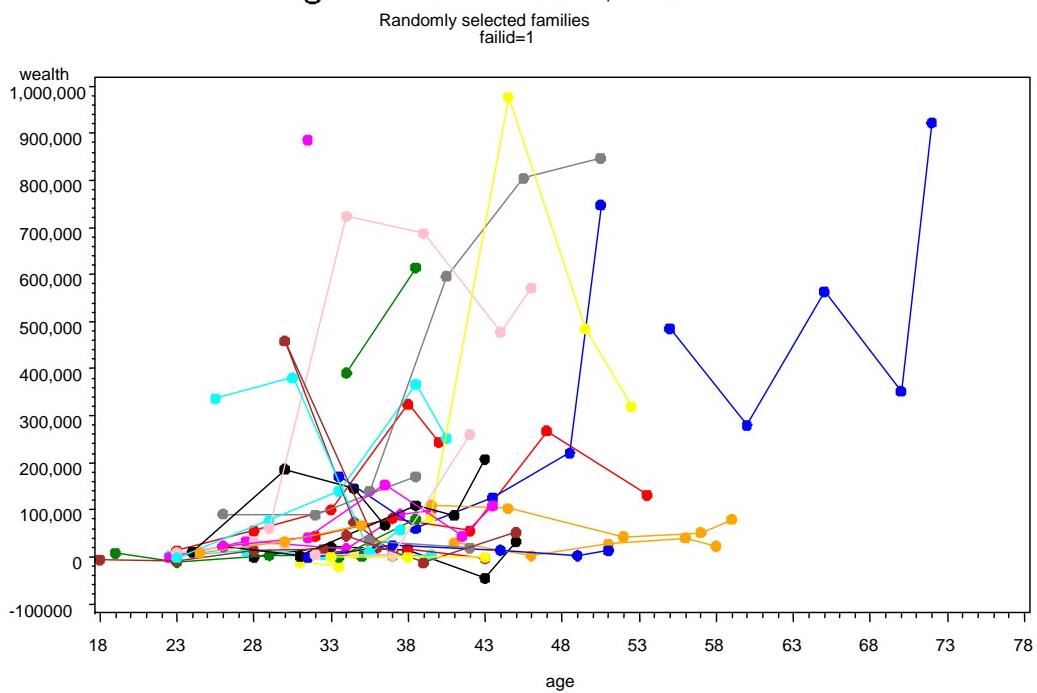
FIGURE THREE

Following Littell, Stroup and Freund's (2002) recommendations on fitting linear models with random effects and specified variance structures, I first nominated the fixed effects which I expect to influence the dependent variable. When evaluating alternative variance structures, the fixed effects must be held constant for the various model fit results to be comparable. These fixed effects, of course, are somewhat provisional since the variance structure that best represents the data pattern will, in turn, influence whether the covariates will be statistically significant. The fixed effects incorporated in the model include measures of time, family education, marital status, age, minority status, small business ownership and failure.

With the fixed effects selected, I turned to the variance structure. Since the model measures wealth of a family over time, several autoregressive structures were attempted first. Autoregressive structures presume that residuals (error) from the linear model will be correlated over time, and will be more highly correlated the closer in time they are. That is, errors at time 2 will be highly correlated with those at time 3, but less with those at time 4 and less still with errors at time 5.

However, despite their intuitive appeal, autoregressive variance structures[13] did not satisfactorily account for the pattern of residuals observed in the data. Instead a simpler unstructured specification of the form

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[13] First order autoregressive and heterogeneous first order autoregressive structures were fitted, as well as banded, Toeplitz, exponential, compound symmetry and power models of variance. The latter three caused the model to have difficulties converging or produced estimated G matrices that were not positive definite due to their complexity and were therefore ruled out.

$$\begin{matrix} \sigma_1{}^2 & 0 & 0 & 0 & 0 \\ 0 & \sigma_2{}^2 & 0 & 0 & 0 \\ 0 & 0 & \sigma_3{}^2 & 0 & 0 \\ 0 & 0 & 0 & \sigma_4{}^2 & 0 \\ 0 & 0 & 0 & 0 & \sigma_5{}^2 \end{matrix}$$

provided the best results as judged by comparative Akaike's Information Criteria (AIC) and -2log likelihood calculations. Note that this structure presumes no correlation between errors observed at different time periods, i.e. errors are independent.

Next, I introduced the random effects into the model. A random intercept component was specified first in the assumption that each family in the sample displays an idiosyncratic deviation from the mean level of wealth at the beginning of the survey that would be useful to account for in isolating the main effects of age, education, failure, etc. The fit indicators demonstrated that this additional variable was unnecessary, providing no better explanation of the wealth distribution.

Likewise, a random slope component associated with time did not explain a significant amount of the variability in the model. The random slope component b_i adds a family-specific adjustment to the time coefficient β_{year}, meaning that a perturbation to the rate of wealth increase can be estimated for each household based on the additional information provided by the repeated wealth measures. Thus, each family would display faster or slower growth than implied by the effect of the covariates alone, and this result would be distinguishable from pure measurement error. However, the random slope specification provided no additional explanation to the variability observed; significant

non-zero idiosyncratic accumulation rate components can only be observed for less than 20% of the families.

The lack of importance of random effects points to two things. First, it implies that the fixed effects included in the model account for a relatively large amount of variance observed in wealth. The use of REML estimates as implemented in the SAS software package cannot generally provide an R^2, since it is not a classic Analysis of Variance (ANOVA) problem. In a separate analysis I used the PROC GLM routine to get a rough gauge of the percentage of variance explained. The two models are not directly comparable, since PROC GLM, among other differences, deletes all cases with incomplete information and makes assumptions about multivariate normality that are far more stringent than does the iterative PROC MIXED estimation algorithms. However, just as a very rough analogue, the GLM least-squares method returned an R^2 of 0.55 for the basic model, which is an appreciable amount of variance explained.

Second, random effects will often be found to be inconsequential when there are relatively few measurements per subject from which to estimate subject-specific components, or when within-subject variability is large compared to between-subject variability (Verbeke and Molenberghs, 2000). Both conditions are evident in this data sample.

The investigation into random effects was not in vain. Per Verbeke and Molenberghs (2000), I did use the random effects as diagnostic tools to detect outliers. Examining the predicted values based on random effects led to the discovery that there were three families whose net wealth was persistently over $10 million. All of these households had failed businesses; one had done so prior to becoming a multimillionaire.

Since the three exerted such strong influence on the regression results and were not typical of those contemplating entrepreneurship, they were removed from further analysis.

With the variance structure satisfactorily specified and the random effects rejected, I then ran the model with the fixed effects. For Hypotheses One and Two, the coefficient of the most interest is β_{failed}, a dummy where 0 indicates that an individual in the household did not close an unsuccessful business at that time period, and 1 indicates that either the head or the spouse did close a business that qualified as a failure.

Table Two below shows the results of the model with up to five time measures, with log-wealth as the dependent variable.

TABLE TWO
Mixed Model Analysis
Dependent variable=log
wealth

Independent Variables	Unstandardized Regression Coefficient	Standard Error
Intercept	13.825***	0.0128
Year	0.023***	0.0031
Minority[a]	-0.037***	0.0103
Age[c]	0.0054***	0.00055
Age[c] ^{2}	-0.00006*	0.00003
Education[c]	0.015***	0.0020
Married[a]	0.064***	0.0099
Small business owner (SBO) [a]	0.149***	0.014
Failed[a]	0.051**	0.0181
Diagnostics		
Chi squared	4, 1618.74	
-2 Res LL	-4.5	
AIC	5.5	
BIC	26.6	

[a] Time-varying dummy variable
[c] Centered on grand mean

* $p<0.05$
** $p<0.01$
*** $p<0.001$

- Does not include several statistically significant interactions involving "age" and other variables that offered trivially small coefficients.
- Random intercept and slope specifications dropped due to lack of improvement.

TABLE TWO

As expected, the coefficients of the control variables were all highly significant

with the expected signs. Following the previously discussed labor economics theory, an

age^2 variable was included and found significant[14], although its practical impact was muted by the log transformation of the wealth measurements.

Hypothesis One suggests that the *rate* of growth of a failed entrepreneur's assets will lag behind that of a comparable traditionally employed household or one with an existing small business. In terms of the model, this requires an interaction between the dummy variable for failure and the time (year) variable, when all failures are assembled such that they take place at Time One and recovery is measured to Time Two (five years later for most families) and beyond. Such an interaction would indicate that whatever wealth accumulation can be expected simply by the passage of time and a household's normal saving habits, failing a business will alter that accumulation even more than what would be expected simply by adding the effects of the two. This interaction is not statistically significant, however, implying that the presence of a business failure has no connection to a household's *rate* of asset accumulation over time.

Hypothesis Two suggests that business failure is associated with lower absolute wealth during the year in which the household's business failed. Such a decrease in net worth might indicate lingering debt from the failed business or the hasty disposal of a business which had previously contributed a positive value to family wealth. However, Hypothesis Two receives no support from the model. Instead, the opposite effect is observed; the coefficient of the failure variable is significant and positive, indicating that

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[14] One must generally be wary of multicollinearity issues when introducing polynomial equations since all lower order terms must also be included in the model. Following Cohen, Cohen, West and Aiken (2003) I have centered all measures for which I use polynomial representations. This removes the nonessential multicollinearity brought about by scaling, leaving only the essential (and usually much smaller) multicollinearity produced by asymmetry in the underlying distribution.

knowing a family failed a business during the year would lead one to predict higher wealth than for a non-entrepreneurial family.

What does this "wealth bonus" represent? Does it illustrate the return of invested start-up capital? Or does it simply indicate that even failed businesses generally provide enough of a return to increase wealth? To help understand its meaning, we must address how the data were structured. The positive effect of failure may be generated by the relationship between the small business owner dummy variable and the failure indicator. Table Two shows the strong wealth effect associated with business ownership. However, since the model defines a household who has failed a business as no longer a small business owner (unless it owns other surviving businesses, a relatively rare occurrence), the failure variable in effect "substitutes" for the lost SBO indicator, at least at the time of failure. It is notable that $\beta_{failure} < \beta_{SBO}$ and differ by at least 0.055 (the lower 95% confidence limit of the difference, $p < 0.001$), suggesting that while a business failure may still leave a family with higher relative wealth to the non-entrepreneurial population, owning a surviving small business is associated with even greater wealth. This failure effect appears to represent an immediate penalty only relative to continued small business ownership.

To determine if the failure bonus persists, I re-ran the same model, adding a one-period lag of the failure dummy variable (not shown). The lag effect was insignificant, suggesting that knowledge of a prior failure is of no value in predicting family wealth five years or more after failure; the failure bonus can be observed immediately after closure, but dissipates quickly.

This may have implications for how liquidity constraints operate. Most discussions portray liquidity constraints as the stake an entrepreneur must take in his/her own firm to either 1) assemble the minimum amount of resources required to make a reasonable start-up effort, or 2) overcome investor and lender reluctance and signal his/her own commitment to the enterprise in hopes of getting further seed money, or 3) both (see Evans and Jovanovic, 1989; Amit, Glosten and Muller, 1990; Holtz-Eakin, Joulfaian, and Rosen, 1994b; Holtz-Eakin and Rosen, 2001). In any case, all accounts agree that stake must be at risk. Potential lenders and other claimants will want assurances that they will recover their assets in the event of a problem, leaving the entrepreneur's own stake as the first to be lost. However, the findings detailed here indicate that since failure is associated with higher wealth, either the initial stake is largely recouped upon failure, or perhaps it was never at risk to begin with.

Since the coefficients presented are applied to a logarithmically transformed dependent variable, they are not immediately interpretable in the usual way we assess linear regression. Instead, they represent log-dollar impacts, so in order to estimate wealth in real dollars for a given household profile we calculate the prediction equation and apply the result as a natural log exponent. A single calculation can be represented as

$$\text{Real dollar wealth} = e^{(13.825+0.023*year\ -0.0237*minority\ +\ldots0.051*failed)} - 995{,}761$$

where the subtracted term represents the maximum indebtedness observed. This term was added into the transformation so that the log of a negative number would not be taken and generate a computation error. Because the coefficients in the log equation are multiplicative, their impact will depend upon the value of other independent variables.

To assist in assessing the relative impact of the coefficients, Table Three below provides some sample calculations at various levels of the independent variables. Mean age at first measurement for the sample is 34.26 years of age and mean level of education is 12.86 years (just less than a year of college), and dollars are rounded to the nearest hundred.

TABLE THREE: Wealth Profiles For Representative Families			
Profile	*Non-Failed, Non-Self Employed*	*Recently Failed*	*Self-Employed Business Owner*
Single, white, mean age and education	$37,300	$91,300	$203,200
Married, white, mean age and education	$105,500	$163,200	$282,500
Single, white, mean age and college degree	$62,600	$117,700	$226,200
Married, white, mean age and college degree	$132,300	$191,300	$313,500
Single, white, mean age and 9th grade ed	-$20,700	$30,300	$136,000
Married, white, mean age and 9th grade ed	$43,700	$112,400	$210,800
Single, minority, mean age and education	-$300	$51,800	$160,000
Married, minority, mean age & education	$65,500	$121,000	$236,100
Married, white, age 50, mean education	$158,600	$218,900	$344,000

For most profiles, the average amount of wealth held by recent failures is between $50,000 and $60,000 higher than households in traditional employment, and households with a current small business owner generally retain between $160k and $180k more than the traditionally employed households.

Manufacturing and high tech sectors

Having measured the relationship between the wealth of failed business owners, successful business owners and non-entrepreneurs, I performed some exploratory analysis to see what conditions might help explain these observations. I created two dummy variables based on the recorded industries and occupations of the failed entrepreneurs. The first variable labeled the closed firm with a "1" if it was a manufacturing firm, which included all mining operations, producers of durable goods, non-durable goods other than farm products[15], and transportation services and utilities. My rationale was that these firms were more likely to have high fixed costs that would require greater capitalization by the entrepreneur and thus perhaps put more of his or her money at risk. Service firms and others received a value of "0" for this variable. Based on this algorithm, nine failed firms qualified as manufacturing operations.

The second dummy variable labeled firms as high-tech if they performed research and testing, were in computer and communication-related fields, or were involved in pharmaceutical research or production. Those failed entrepreneurs who identified their occupation as engineer or scientist were also considered high-tech, resulting in a total group of six. Two firms, an aerospace component manufacturer and a natural-gas extraction company started by a geologist, qualified for both manufacturing and high-tech designation.

When these variables are included in the regression, the results do change somewhat despite the small size of these two groups. The six firms regarded as high-tech exert a disproportionate amount of influence on the prediction equation. High-tech membership is highly significant (p<0.001) and has a coefficient above 0.2, larger than

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[15] Farmers were already excluded when defining failures.

even the benefit conveyed by small business ownership. Partialing this group out of the regression also renders the failure designator insignificant at p=0.17. The value of the failure coefficient remains positive but shrinks in size from 0.051 to 0.033. These six families are evidently quite distinctive; all of the entrepreneurs hold at least a four-year college degree, three had a wealth of over one million dollars at some point during the study, and three opened new businesses after their initial failure. While the sign of the failure coefficient is positive for the full sample, the six failed high-tech firms clearly help the failure variable reach conventional levels of statistical significance.

Those entrepreneurs whose firms are involved in manufacturing (or other highly-capitalized endeavors) may not enjoy the failure bonus upon exit. At a significance of p=0.07, the coefficient of the manufacturing group is negative (-0.08) as long as the high-tech group is also included in the regression. Since only nine firms qualified as manufacturers, it is reasonable to conclude that the marginal level of significance observed is an issue of statistical power; it should not be surprising that those firms requiring a higher initial outlay for production equipment may have more at risk than an "easy in, easy out" service firm. Again, these are exploratory looks at the data, and future work should more carefully examine the relationship between operating a capital-intensive business and the subsequent wealth impact of failure.

Characterizing failure

Having identified the failed households and compared their wealth accumulation to peer families in the traditional labor market, I then turned my attention to further

analyzing how the conditions of failure may have affected the post-failure path of the household.

Bankruptcy

One particularly unpleasant possibility after the collapse of a business is personal bankruptcy. In the case of unincorporated firms, which represent the majority of cases in the sample, the personal assets of the proprietors are not protected in the event of a bankruptcy as is the case with incorporated business. Therefore, if the business goes bankrupt we would expect serious financial consequences with potential long-term repercussions as the debtor household struggles to restore its credit.

In the 1996 PSID survey, respondents were asked a series of questions about any bankruptcies they had filed. Of the 72 households in my sample which had failed a business by that point, 61 were asked the question and responded. Assuming they answered truthfully, it is notable that only one of the households reported being forced into bankruptcy at or around the time of their failure due to the response category "loss of job; failure of business." Six others declared bankruptcy at some point between 1985 and 1991 for reasons including divorce/separation/death of spouse (2 respondents), medical problems (1 respondent), and debts/credit card misuse (3 respondents). The three households which filed due to debt problems all filed either well before or well after their businesses failed. No data was collected on whether incorporated businesses had filed for bankruptcy via Chapters 7 (liquidation) or 11 (reorganization).

As this is an unweighted sample, it is not appropriate to make population-level statements about likelihood of bankruptcy among failed firms. However, this data

indicates that it is at least somewhat unusual for the failure of a business to precipitate a

personal bankruptcy claim, even for unincorporated businesses where the owner is held

liable for the debts of his/her firm. To be sure, many businesses go bankrupt every year

with liabilities exceeding $100,000 (McNeill and Fullenbaum, 1994), but the PSID data

suggests that this is far from the typical experience.

Failure and the serial entrepreneur

Which failed entrepreneurs are more likely to become self-employed again in the

future? In order to answer this question, I use logistic regression techniques to determine

what factors increase the "hazard rate" of again becoming a self-employed business

owner. Thirty-two of the 115 failed households tried their hand at ownership again at

some point after failure, and almost a third of those 32 did so within five years of the first

closure. Because of right-censoring of the data (those who failed recently may yet start

another firm), the actual percentage would probably be higher if we included data after

2001. The dependent variable is a binary outcome with 1 representing subsequent small

business ownership at some point during the survey and a 0 representing traditional

employment until retirement or the end of the observation. Multiple logistic regression

takes the form:

$$\ln (\hat{p}/1- \hat{p}) = (B_1X_1 + B_2X_2 + \ldots B_kX_k + B_0) \text{ where}$$

$\hat{p}$ is the predicted probability of the subject being a case (i.e., a "1") of serial

entrepreneurship, and the right side of the equation represents the standard OLS solution

for a dependent variable. Note that the B coefficients are expressed in terms of odds

ratios for logistic equations. The left hand of the side is in units called "logits" which,

while not particularly meaningful in their own right, can be algebraically manipulated to

yield

$$\hat{p}_i = \frac{1}{1 + e^{-((B1X1\ +B2X2\ +\ ...BkXk+\ B0)}}.$$

where $\hat{p}_i$ = the predicted probability of case membership for a particular subject (Cohen,

Cohen, West, and Aiken, 2003).

Table Four below displays the results of the logistic regression. Control variables

were measured at the period of the first failure, with the exception of family income,

which was measured the period after failure to account for the possibility of the

household being declared a failure due to subsequent unemployment. The full model

represents the prediction equation with all variables of theoretical interest included. The

reduced model removes those which proved nonsignificant in order to produce a

parsimonious prediction equation and highlight those variables which appear to provide

insight into subsequent business starts.

	Model 1 (full): Coefficient (standard error)		Model 2 (reduced): Coefficient (standard error)	
Independent Variable				
Transformed wealth	0.747***	(0.252)	0.6251***	(0.201)
Minority	0.204	(0.327)		
Age_c	-0.036	(0.315)		
$Education_c$	0.405*	(0.209)	0.457**	(0.204)
$Education_c^2$	-0.046	(0.044)	-0.074***	(0.039)
$Education_c^3$	-0.029***	(0.012)	-0.03***	(0.011)
Married	-1.189*	(0.646)	-1.258***	(0.364)
Trans Family Income	-0.035	(0.058)		
Head failed prior firm	-0.502*	(0.276)		
Diagnostics				
R^2	0.3572		0.3085	
Max rescaled R^2	0.4762		0.4114	
Hosmer/Lemeshow Goodness of fit test	$Chi^2=6.88$	df=8 p=0.55	$Chi^2=11.61$	df=8 p=0.17

TABLE FOUR
Logistic Regression, 1=Serial Entrepreneur

[a] Time-varying dummy variable
[c] Centered on grand mean

* $p<0.1$
** $p<0.05$
*** $p<0.01$

TABLE FOUR: Prediction of Future Entrepreneurship Conditional on Failure

Transformed family income is highly correlated with both education and marital status and impairs the significance of these variables while adding no explanatory power. Age and minority status do not appear to influence the likelihood of future starts.

Households for which it was the head's business that was lost are less likely to try again, although the statistical significance is marginal at best.

Proposition A states that those families with higher wealth after failure will be more likely to own another business in the future. The results of the logistic regression lend evidence to this proposition. For each unit of log-transformed wealth, the odds of the household rejoining the ranks of the self-employed increase approximately 50%. In real dollar terms, this means that the likelihood of subsequent entrepreneurship rises with wealth, but at a decreasing rate.

Proposition B, which posits that high current income will act as an inhibitor to future entrepreneurship, receives no support from the regression results. Regardless of whether income just after failure or income five years later is used, neither income nor log-income is statistically significant in predicting future starts.

Note that education appears to be significant predictor of serial entrepreneurship conditional upon failure, following a cubic function demonstrated on Figure Four below (which, due to the very minor effect of the cubic term coefficient, is nearly indistinguishable from a quadratic pattern)[16]. The increasing propensity toward further entrepreneurship that comes with more education, even after controlling for wealth, is consistent with other accounts of the role of education (Rees and Shah, 1986; Borjas and Bronars, 1989).

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[16] See footnote 14 on page 81 for a discussion of how centering makes polynomial equations computationally tractable by removing most of the multicollinearity between the related terms. For example, centering the terms reduces the correlation between the quadratic and linear terms of education from 0.99 (uncentered) to -0.34 (centered).

Predicted Probabilities of a New Start, by Education
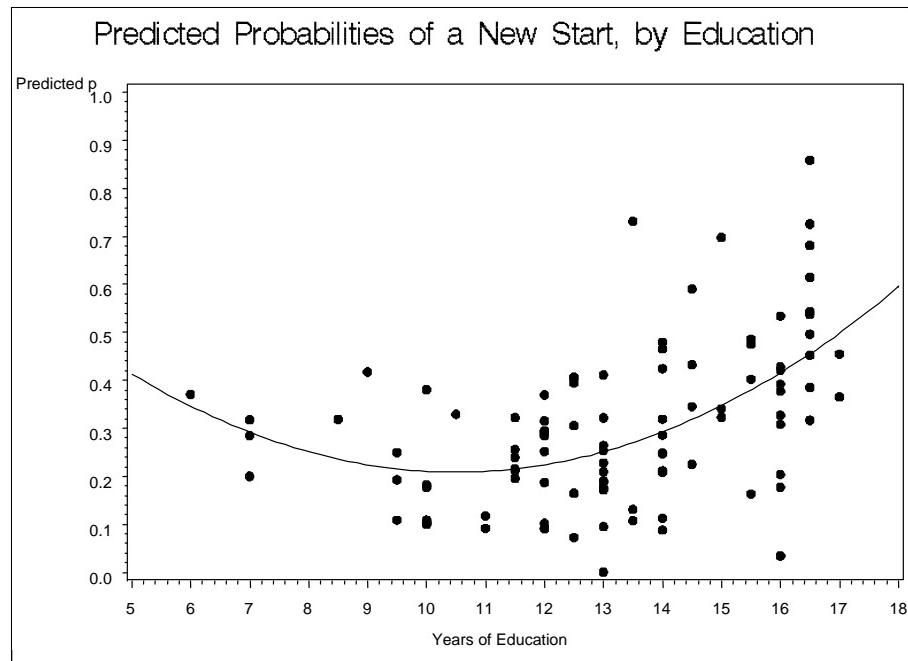
FIGURE FOUR

However, while prior accounts of education as a predictor have assumed a linear relationship, the U-shaped relationship observed here may have to do with the low returns typically available to those with less education. With poor labor market prospects in addition to (likely) having little wealth at risk, these individuals may be more willing to gamble their small incomes provided by the labor market in hopes striking it rich in self-employment. Alternatively, given the prevalence of minimum compulsory education requirements in the U.S., these very poorly educated households could be immigrants, who are thought to be more likely to enter self-employment (Fairlie and Meyer, 1996; Borjas, 1986).

Also of note is the negative impact of the marriage on subsequent self-employment. Married couples are less than half as likely to start another business after the first has failed. This too is consistent with prior literature, which finds that while a

high proportion of current entrepreneurs are married, the likelihood of transitioning *into* entrepreneurship is lower among married people (Hamilton, 2000; Evans and Leighton, 1989).

In short, it appears that there is little evidence that the factors influencing a second episode of entrepreneurship are any different than those that would be expected to influence a first. There is no evidence of a chastening effect upon a household once bitten, nor can we observe any factors that would uniquely predict further entrepreneurship for a failed household. Wealth is still the strongest predictor; six of the top 10 wealthiest families (less the multi-millionaire outliers) at the time of failure went on to restart businesses. Education is also significant, with higher rates among college-educated households and those with less than 10 years of formal schooling.

Failure and future wealth

The graph below (Figure Five) depicts post-failure wealth behavior with the households arranged into a synthetic cohort where Year 1 is first wealth measurement after failure:

Post failure Profiles, Failures
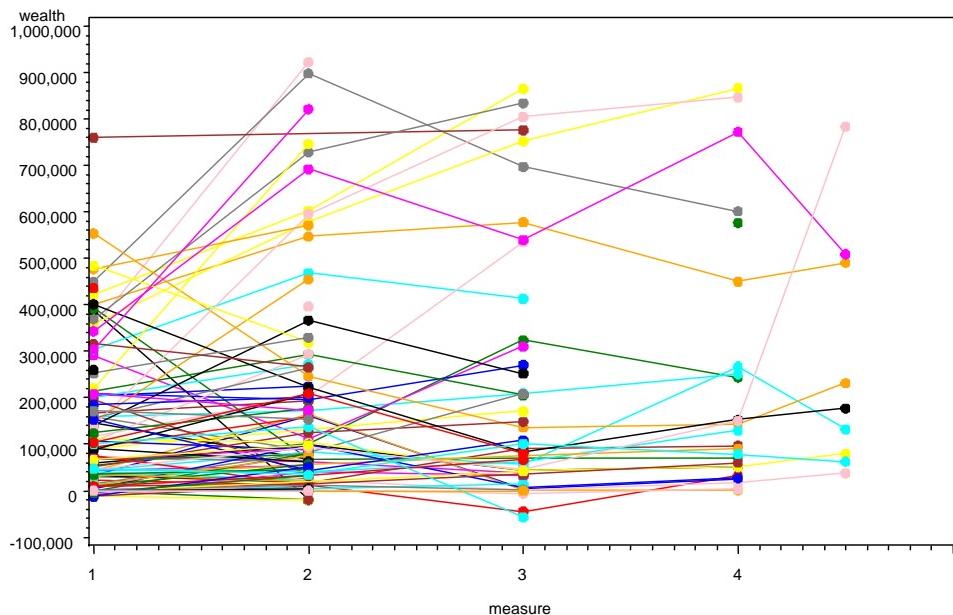
FIGURE FIVE

While Figure Five is a bit noisy, it shows that most failed households have less

than $250,000 in wealth, and that most households either maintain approximately the

same level of wealth for subsequent periods, or accumulate more. A more comprehensive

look at the factors behind these wealth curves follows.

As discussed, the failed households in this sample on average maintained greater

wealth than comparable wage-employed households but enjoyed less wealth than did

successful business owners. However, this says nothing of what influences the wealth of

one failed household versus another as they recover from their failed enterprises. To

some extent, we would expect certain factors to continue to predict wealth regardless of

whether the household lost a firm or not. For example, the strong wealth-preserving

effect of marriage should continue to hold for failures, successes, and employees alike.

Testing Propositions C and D, then, requires a similar method as that used in testing Hypotheses One and Two. I use the same control variables (year, age, education, minority status, marital status and subsequent self-employment) plus a categorical measure of risk tolerance (low or high) and a dummy variable measuring whether the failed business was incorporated or not. Again, the control variables are permitted to vary depending upon their measure during a particular year. Table Five below shows the full model and the reduced model with insignificant variables removed.

	TABLE FIVE			
	Post-failure Wealth Accumulation by Failures			
Independent Variable	Model 1 (full): Coefficient (standard error)		Model 2 (reduced): Coefficient (standard error)	
Intercept	11.816***	0.1453	11.675***	0.097
Year	-0.024	0.0468	--	--
Age_c	0.030***	0.005	0.0270***	0.004
Age_c^2	-0.0006*	0.0003	--	--
Minority	-0.386***	0.1041	-0.356***	0.010
Incorporated	0.642***	0.1110	0.6717***	0.109
Risk (high)	-0.182*	0.093	-0.1788*	0.094
$Education_c$	0.120***	0.0185	0.1251***	0.018
Married	0.465***	0.0978	0.4913***	0.097
Self-Employed (serial)	0.356***	0.1222	0.3818***	0.120
Diagnostics				
Chi squared	4, 115.6		4, 115.28	
-2 Res LogLike	742.2		726.3	
AIC	752.2		736.2	
BIC	765.9		750	
[a] Time-varying dummy variable				
[c] Centered on grand mean				
* p<0.1				
** p<0.05				
*** p<0.01				

TABLE FIVE: Prediction of Future Entrepreneurship Conditional on Failure

As Table Five shows, the same factors which predict wealth in a mixed sample of business owners, failures and wage-employees can, for the most part, be used to predict the wealth accumulation of those households who have failed. The only exception to this is β_{year}. Under the mixed sample, the natural growth of wealth simply by virtue of remaining gainfully employed was captured by a significant positive coefficient for the year variable. However, the nonsignificance of this term in the present regression implies that the mere passage of time cannot be demonstrated to aid the wealth accumulation of failed entrepreneurs in the same way that it does the mixed sample. It does not mean, necessarily, that the future growth of their assets is stunted; it means only that variance accounted for by other variables renders β_{year} unable to explain any more[17].

The current regression provides strong evidence in favor of Proposition C. Incorporation of the failed business is associated with a very large positive wealth effect in the years after failure relative to those whose ventures were not incorporated, an even larger effect than marriage or subsequent business ownership. The ex-owners of the 26 incorporated firms held, on average, four times the wealth that the ex-owners of the 89 proprietorships did at the time of failure. Does this mean that all entrepreneurs should incorporate at the first opportunity in order to limit their losses should they fail? While incorporating is probably not a bad idea given the relatively low cost, some caution is due in the interpretation of this relationship. Based on the structure of the study, we cannot rule out the alternative hypothesis that households who already enjoyed above-normal wealth chose to incorporate as a protective mechanism; perhaps those with lower wealth

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[17] Performing the regression with the serial entrepreneurs excluded gives the same essential results. Thus, any advantage enjoyed by serial entrepreneurs, which if present should be captured in the appropriate self-employment covariate anyway, is not confounding any hypothesized impairment of wealth growth by the failures; the passage of time appears thoroughly insignificant to the wealth prospects of the once-failed entrepreneurial households.

did not feel a strong need to do so. Rather than incorporation acting as a shield against creditors, it could be that it is merely a signal of greater pre-existing wealth. One could also hypothesize that households with greater business savvy choose to incorporate and because of that savvy are also more successful in accumulating wealth. I leave the exploration of these questions for future work.

Proposition D receives some weak support. For respondents taking the risk tolerance survey, those who scored higher than the median tended to have lower wealth than those who scored low, at a marginal level of significance (p=0.057). Recall that the test I have constructed measures wealth conditional upon a prior entrepreneurial failure; therefore, it truncates the risk/return curve to capture those who may have gambled big and lost big, without the offsetting effect of those who gambled big but won. The result may say something about the willingness of more risk-tolerant entrepreneurs to persist in the face of poor performance in the hopes of turning the business around, and this will be addressed in the next chapter.

Industry switching and workforce withdrawal

While the industry of the failed self-employed business owner and that of his/her following job was not always available, it may be instructive to review the summary information that did emerge.

As Table Six shows, just over half of failed entrepreneurs for whom data was available returned to the same industry or one related to that which they had participated in as business owners. What is less clear is whether those who switched were returning to

a line of work they knew before entering self-employment or whether they began a fresh

start in a novel industry.

	Heads	Wives*	Total
With before and after industries	28	8	36
Switched industries	14	3	17
Did not switch	14	5	19
Left workforce	2	12	14
Unavailable or unemployed	6	1	7

*Totals will not add since some failed wives who became housewives had no industry
listed for their time in self-employment
TABLE SIX: Industry Switching After Failure

What is more striking is that of the wives who failed a business, over a third

withdrew from the labor force entirely and identified themselves as housewives in the

period(s) after failure[18], including almost all who failed in the 1984 cohort. The only

heads of household to quit (not retire from[19]) the workforce were one who was disabled

and one who appeared to go to prison. This shouldn't be too surprising based on the

definition of "head of household", but the withdrawal of so many wives implies that their

businesses were not being counted upon to provide a large proportion of family income,

and this may have impacted the effort put into keeping them afloat. This is consistent

with Headd's (2003) finding that women-owned businesses which closed were more

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[18] This number does not include those who were unemployed but looking for work. The "unemployed but looking" wives (and heads) are considered to be still engaged in the labor market.
[19] Recall that those who closed their businesses and subsequently retired were not declared failures by my definition.

likely to be regarded as successful by their owners, perhaps because of modest aspirations.

Attrition and inference

Some final remarks are in order on the attrition of panel data and, on the PSID in particular, as it may bear on the validity of my inferences. Attrition is a common problem any time repeated measurements are needed (Cohen, Cohen, Aiken and West, 2003). Subjects move for various reasons, sometimes leaving no way for researchers to contact them. Often, subjects will withdraw from the study due to lack of interest or time. Eventually, subjects in a lifetime panel such as the PSID will die. Researchers still lack effective incentives for encouraging dead subjects to respond (Dillman, 2000).

While any attrition complicates statistical tests by reducing sample sizes and unbalancing data, as long as the losses are random this causes few problems for inference (Verbeke and Molenberghs, 2000; Diggle, Liang and Zeger, 1994). When subjects drop out for identifiable systematic reasons, however, this can result in biased estimates and/or inflated standard errors and the attendant loss of statistical precision. For example, if it is the case that poorer respondents of the PSID systematically drop out at a higher rate than wealthier respondents, we would expect to see certain patterns as time went on: a decrease in variance in sample wealth, a higher than expected loss of minority subjects if wealth is correlated with race, a disproportionately high representation of married couples, and the like.

Several studies exist which analyze dropout patterns in the PSID. As discussed earlier in the paper, Becketti et al find that some variables are correlated with

survivorship but that "these variables explain only a negligible proportion of attrition in the PSID" (Becketti et al., 1988; 490-491). Fitzgerald, Gottschalk and Moffit (1998) examine intergenerational dropouts and find that when the parents are lost, the children often attrite as well, particularly among non-white families and those where the father has no income. However, they do note that the R^2 for these relationships are very small, indicating that they do not explain much of the dropout rates (Fitzgerald, et al, 1998).

Nevertheless, since not every combination of variables can be tested to evaluate whether attrition is systematic, an outcome-specific analysis must be performed. Following Fitzgerald, et al (1998) I ran a probit regression on the mixed (failure and nonfailure) sample to isolate what factors may increase the chance of dropout. Those who were in the study at the time 1, immediately after failure but gone by time 2 were labeled dropouts and given a value of 1. Those who remained received a 0. The probit regression (Appendix A) determined that the only two variables of interest which appeared to influence dropout are marital status and failure. Unmarried individuals are about twice as likely to drop out (p=0.048). However, since individuals represent only 28% of the sample at time 1, the effect is unlikely to be too severe. A subsequent logistic regression echoes the result of the probit analysis, and an analysis of the failure-only sample also shows the greater retention of married households. These results are consistent with Becketti, et al's more comprehensive attrition evaluation of the overall PSID (1988: 483).

The second variable is of more concern. Not surprisingly perhaps, households who have been determined to have failed are more likely to attrite from my subsample of the PSID. The logistic regression procedure provides a point estimate of the odds ratio of 2.86, meaning that a failed household is almost 3 times as likely to drop out as a

nonfailed household. Of the mixed sample, only 21 households out of 513 were not

available for the second measure, so this measure is not stable, and the software issued an

appropriate warning to that effect. Note that in order to be labeled a failure in the first

place, the family must have at least stayed long enough to provide a post-failure wealth

measurement; those who lost a business but disappeared before they could report this to

an interviewer would not have been screened as a failure. The odds ratio calculated

measures the likelihood that those who failed will survive in the sample for one more

measurement after their initial post-failure survey.

Attrition for the overall sample was moderate. As noted, most households (96%)

had at least two consecutive measurements for wealth by design. There were at least three

measurements for wealth for 69% of the sample, at least four measurements for 42% of

the sample, and nearly a third, 32%, remained in the sample for the entire 18 years and

provided data on their wealth on five separate occasions.

One potential weakness of this study is the possibility that those entrepreneurs

who fared particularly poorly are the ones who are most likely to drop out. It isn't hard to

envision a situation where an entrepreneur, stuck with the debts of an imploded business,

sells the family house and moves away, never to be interviewed by PSID researchers

again. If this is the case, the families who stayed in the survey may represent the upper

tail of the failure distribution and thus their relative financial success demonstrated in this

dissertation might overstate that of the true population of failures.

However, I feel that this particular scenario is somewhat unlikely since

bankruptcy laws in most states protect a primary home from seizure by creditors

(Berkowitz and White, 2004). The "homestead clause" permits a bankrupt business

owner to retain the same home mailing address as before the failure. Survival studies of the past were dogged by nonresponse problems because they used the business address of the firms, which, by definition, was no longer valid for failed enterprises (Dennis and Fernald, 2001). The PSID, however, uses home addresses, and regularly provides postage paid change-of-address cards to subjects, as well as provides financial incentives for response (Hill, 1992). If, as it appears, failed entrepreneurs are difficult to retain, mobility shouldn't be the primary reason. And since diagnostic tests determined wealth and income to be insignificant in predicting who drops out in later stages, there is little reason to believe that a serious financial blow will render a failed entrepreneur any more likely to drop out than someone who loses a great sum of money to the stock market, divorce, or other economic calamity.

6   Discussion

From the results of the panel study it appears that the financial consequences
borne by the typical failed entrepreneur are fairly minimal. Instead, personal wealth at the
time of failure is predicted to be higher than that of a demographically comparable
household which has not engaged in entrepreneurship, but still lower than that of a
household with a thriving business.

Liquidity constraints, buffer stocks and protecting the nest egg

At least two complementary possibilities suggest themselves as to why, in the
face of such an extreme definition of failure, we can anticipate higher wealth rather than
lower for a household recently exited from unsuccessful self-employment. A combination
of enhanced precautionary savings prior to entry with early, risk-averse withdrawal in the
face of a likely negative outcome may interact to produce the anomalous finding of
higher wealth at failure. These two conditions will be addressed in turn.

One possible explanation for the "failure bonus" can be found by considering the
confluence of the liquidity constraints literature and the extensive labor economics work
involving savings. We must first consider the proposed motivation behind savings
introduced by Friedman (1957) and further elaborated by Carroll (1997). According to
this buffer stock savings model, individuals with more uncertain income streams save
more to compensate for the higher possibility of negative shocks in the future. Quadrini
(2000) and Carroll and Samwick (1995) test this hypothesis and find that occupations

subject to higher variations in earnings, including farmers and the self-employed, have higher savings rates than traditionally employed workers. Friedman's original formulation tested farmers and also found that they indeed save more (1957). Thus, the higher wealth observed at the start of a business may be a rational means of preparing for a more uncertain future income rather than the manifestation of a capital market imperfection.

The implicit assumption in the liquidity constraints literature has been that the additional money that appears to be a precondition for entrepreneurship is earmarked for the fledgling business. The entrepreneur must capitalize her business and invest enough of her own money to induce other investors and lenders who lack the information the entrepreneur has about herself and the business to do so as well (Amit, Glosten, and Muller, 1990).

However, as Meyer (1990) finds that over 60% of the entrepreneurs he studied began with $5,000 or less, it appears that for a significant number of businesses, actual start-up costs are fairly minimal. Therefore, it might be possible that the higher-than-average wealth commonly observed just before start-up represents buffer stock wealth retained within the household as well as (or even rather than) capital invested in the business. As fledgling entrepreneurs prepare for their leap into self-employment, they tend to save more money not only to help capitalize the firm, but to prepare a cushion for possible lean times ahead since the outcome of the venture is far from certain. The positive coefficient for the failure variable may indicate that upon closure, households still retain at least a portion of this buffer stock wealth. When the household returns to traditional employment and the more reliable paycheck that comes with it, the buffer

stock need not be as large and the household allows it to dissipate. Recall that my analysis finds no lag effect of failure; i.e., five years after failure there was no discernible impact of failure, positive or negative. Accordingly, the insignificant lagged failure variable may suggest that five years later, the additional wealth has been spent and the failed household cannot be reliably distinguished from a household in traditional employment all along.

If the additional wealth associated with self-employment consisted solely of business capitalization money, we would expect a failed entrepreneur's wealth to return to a "normal" (i.e. that of comparable non-entrepreneur) level or lower upon the closure of the firm, assuming the extreme definition of failure I have adopted throughout this study. But it does not. Instead, it appears that the entrepreneur actually retains most of the wealth previously thought to be earmarked for the business, despite its closure. Figure Six below graphically shows how an emerging entrepreneur's wealth could be composed of a buffer stock component and a capitalization component; the left side shows how the traditional liquidity constraints literature implicitly regards this wealth, and the right side introduces the larger buffer stock evidenced in the empirical labor economics literature. Even if all business capital is lost in the ensuing failure, Figure Six below shows how the entrepreneur still appears wealthier after closure than a comparable family not involved in self-employment. The exploratory findings discussed in Chapter 5 suggest that the those firms which do require higher capital outlays (e.g. manufacturing or mining operations) will not benefit from the "failure bonus", perhaps since more cash must be used to fund the business.

Two Views of Pre-Launch Wealth

Under Liquidity Constraints Assumptions…

Personal Wealth of Nascent
Self-Employed

Capital for Business
Precautionary Savings

Personal Wealth of
Non-Self-Employed

Precautionary Savings

Under Buffer Stock Savings Assumptions…

Personal Wealth of Nascent
Self-Employed

Capital for Business
Precautionary Savings

Personal Wealth of
Non-Self-Employed

| Precautionary Savings |
| --- |

FIGURE SIX

Still, this may not be sufficient to explain why even unincorporated failed entrepreneurs still appear wealthier after closure. If the assets of the firm and the entrepreneur are inseparable, as is the case of the sole proprietorships in the survey, any remaining debts and obligations of the disbanded firm will still need to be covered from somewhere, and the failed entrepreneur's wealth should decline regardless of whether she draws on business capital or buffer stock savings to pay creditors. The only question then becomes choosing which pocket shall be used to discharge her debts.

That is, unless there are few outstanding obligations. Another necessary condition for the failure bonus centers on the possibility that true economic failure is relatively rare

because of the entrepreneur's ability and willingness to withdraw. Rather than ride an underperforming business into the ground, it may be that entrepreneurs tend to pull the plug on the venture before it threatens their economic well-being. If this is the case, one reason that the failed entrepreneur's savings buffer remains intact is that he or she sees the writing on the wall and dissolves the firm before significant debts accumulate.

Other authors have noted the tentative nature of some entrepreneurial entry (Caves, 1998; McGrath, 1997; Ericson and Pakes, 1995). Uncertain of the prospects of success, entrants start small and pay to "have a look" (Caves, 1998), investing further only if the initial returns appear promising. Losses can be minimized or even avoided by placing small sums at risk and avoiding investment in unsalvageable or illiquid resources, all the while monitoring the environment carefully and being prepared to withdraw quickly in order to preserve household wealth.

In terms of regulatory focus theory (Crowe and Higgins, 1997), such a withdrawal would be consistent with a prevention focus whereby decision-makers, pressed with a possible threat to their safety and security, adopt a perspective concerned with minimizing negative outcomes. The opposite stance in regulatory focus theory, the promotion strategy, is characterized by striving toward an ideal and dedicating effort toward achieving positive outcomes rather than conservatively aiming to avoid losses (Higgins and Spiegel, 2004; Crowe and Higgins, 1997).

Brockner, Higgins and Low (2004) discuss the prevalence and desirability of both promotion and prevention foci at various stages in the entrepreneurial timeline. For example, they posit that a promotion focus, geared towards creating as many "hits" as possible rather than guarding against false positives will be important for invention and

idea-generation (Brockner, et al, 2004: 209). Likewise, it is possible that many small-scale starts can be initiated in the search for the candidate with the best potential. However, in screening potential business ideas it will be important to perform due diligence and narrow the field to those possibilities least likely to fail in advancing to the next step of the notional process (210-211). This would represent a prevention focus. Therefore it is not inconsistent for an entrepreneur to start his business maintaining a promotion focus, intent on fulfilling a lofty aspiration and attempting to realize significant gains, yet shift to a prevention focus of minimizing loss and protecting the family wealth when the context changes and a negative outcome becomes likely.

Indeed, the support for Proposition D bolsters this interpretation. While context surely moderates the relationship between regulatory focus and risk-taking (Crowe and Higgins, 1997), a promotion focus is generally associated with a higher risk tolerance and "eager" response biases and a prevention focus is usually connected to conservative strategies and protective response biases (Higgins and Spiegel, 2004: 7). If this translates to entrepreneurship, then we would expect the more risk-tolerant of the failures to have persisted longer in a losing venture (to try and "ride it out" or fulfill a promotion focus) and thus to have incurred a larger wealth penalty in the ultimately ill-fated firm. Indeed, Bates (2002) finds that entrepreneurs who had heavily capitalized their fledgling businesses at the start were more likely to judge them unsuccessful upon their closure several years later. The results of the test of Proposition D support the persistence of the risk-tolerant; those failures in the upper half of the risk-tolerance distribution did not fare as well wealth-wise than did those in the lower half, all else equal.

Further, as also mentioned in Brockner, et al (2004), Higgins et al (2001) examined regulatory focus theory in responses to sunk costs. The researchers administered a questionnaire that evaluated experiment subjects on the pride taken in past promotion and in past prevention decisions. The results of this tool helped to characterize the subjects as prevention or promotion-focused. When posed with a hypothetical decision whether or not to continue funding an airplane development project that was 90% complete when it is discovered a competitor has completed production of a better alternative, those who prided themselves on successful prevention strategies opted not to throw good money after bad by a rate of 41% over the 19% of promotion-pride subjects (Higgins, et al, 2001). That is, those subjects who primarily prided themselves on avoiding bad consequences were significantly more likely to correctly ignore sunk costs and instead focus on preserving the firm's remaining capital rather than ambitiously trying to sell a slower, more expensive airplane.

In explaining why failed families with self-employed business owners still appear to retain higher wealth than comparable non-entrepreneurial families, then, a complex portrait emerges. Anticipating the risk involved in leaving wage employment, the nascent entrepreneur begins building up his precautionary savings to tide him over if/when the new business is unable to provide enough income for him to maintain his expected standard of living. Surely he also saving to capitalize the business, but following Meyer (1990), Dennis (1999) and Hurst and Lusardi (2004), this amount need not be great for mere *entry* into entrepreneurship. If he has been successful in convincing others to invest in the enterprise, so much the better. However, as shown in other studies, the

entrepreneur's first source of financing will be often be his own savings, and it is often only as a firm grows (or begins large) that outside financing becomes available or even optimal (Cassar, 2004; Berger and Udell, 1998; Van Auken and Neeley, 1996).

After leaving paid employment, the new entrepreneur starts his firm, perhaps amid high expectations of self-actualization and the prospect of great wealth, perhaps as a real option-like trial alternative to his previous career (McGrath, 1997). The business remains open for a while. For whatever reasons, not to include retirement or the acceptance of a higher-paying job, the entrepreneur closes the firm and attempts to return to the labor market. He either took a lower-paying position, is unemployed up to 12 months later, and/or his firm lost money on its way to closure. Yet on the average, he is still wealthier than his non-entrepreneurial peers despite the failure, at least initially. What happened?

Had the firm done well, there would be no conflict between the needs thought to be salient in promotional focus (progress toward a greater, ideal goal and maximizing the number of successes) with those needs associated with a prevention focus (avoiding mistakes and minimizing negative outcomes) (Higgins and Spiegel, 2004). However, faced with the prospect of an underperforming firm, the entrepreneur encounters a conflict between achieving his goal of a successful business and the real likelihood that he will lose a significant amount of money if he continues along the current path. With his (and his family's, if married/cohabitating) financial security threatened, preservation of the more basic needs prevail and he disbands the firm and attempts to return to more stable paid employment.

Of course, not all entrepreneurs follow this cautious course; a cursory glance at Figure Three shows the precipitous wealth loss a few families encounter at failure and beyond, and bankruptcy courts are visited daily by those seeking relief from the consequences of their businesses failures. However, the data here indicate that these cases are not typical. Rather than wait to be forced out of business with heavy losses, it appears that most entrepreneurs who encounter adverse conditions simply fold before their nest egg is endangered, losing only a relatively small ante while still retaining the wealth they saved to get them to the table in the first place. Low sunk costs, high precautionary savings and a quick, relatively painless withdrawal combine to result in the entrepreneur's wealth being higher than what would be expected at the time of failure.

Life after failure

As alluded to in the previous chapter, we see a few patterns of interest in the subsequent careers of those families who have lost a business. It becomes apparent that since almost a third of the households who had failed start other businesses before the their dropout or end of the 2001 survey period, some families regard business failure as only a minor setback if a setback at all. Since I am working with an unweighted sample, it is not appropriate to make population-level assumptions about the propensity of failed entrepreneurs to try again. However, there is nothing to suggest that they are any less likely than wage employees to attempt a new start, and may even be likely if we take into account the right-censoring of the sample data.

Proposition A, which states that failed entrepreneurs from wealthier households will be more likely to try again, is supported by the data. However, this is not too

remarkable since most of the literature on liquidity constraints predicts that greater wealth makes one more likely to attempt self-employment regardless of prior failure. Proposition B, which states that high current income makes a failed entrepreneur less likely to attempt self-employment again, receives no support from the data. Instead, marital status and education are more robust indicators of the propensity to engage in a new start after a failure.

Much of the reasoning that has been applied to who chooses self-employment in general seems to be equally valid in determining who will start another firm in the future after a negative experience. The lack of support for Proposition B is somewhat surprising, however. One would suspect that the hot stove effect might cause failed entrepreneurs to shy away from the risk of another firm when doing so would cause them to forgo a comfortable current income. While this study shows no financial penalty for failing, it still cannot be a pleasant experience. Prospect theory (Khaneman and Tversky, 1979) suggests that decision makers are more inclined to choose certain gains over larger but uncertain potential gains. Yet entrepreneurs are known to be an optimistic bunch (Camerer and Lovallo, 1999; Busenitz and Barney, 1997). Perhaps despite a past failure, these seasoned veterans are confident of their abilities to succeed the next time, and take the long view that a new start is another entry into a temporal portfolio of possible home runs.

Limitations

Like any other piece of research, this study has its limitations. Perhaps the most significant limitation is a conceptual rather than a methodological concern. Since the

purpose of the PSID is to track economic behavior of households over time rather than entrepreneurship per se, only the most basic data about the members' businesses are collected: incorporation status, ownership, industry, valuation, and profitability, and measures of the latter three tend to be spotty. No information is gathered regarding the markets these businesses compete in, how many employees they have (if any), why they were started or disbanded, or even if the firm was purchased, inherited or started de novo.

This raises question of whether the businesses and entrepreneurs analyzed here are really, to paraphrase Bill Gartner (1990), what we are talking about when we talk about entrepreneurship. It is possible that, because the sampling frame consists of households not screened for entrepreneurial intentions, the study captures predominantly those single owner-employee start-ups that account for 76% of new business starts (Dennis, 1999). If this is the case the observations herein are only relevant to only the very smallest of firms, which are not usually of great interest to those in the field of entrepreneurship.

Nevertheless, as mentioned in Chapter 4, I have tried to mitigate this concern by treating as failures only those which report being both self-employed and owning a business. This is meant to filter out those who are informal entrepreneurs or one-person consultancies (those only reporting self-employment) as well as those who are passive investors in local businesses (those reporting ownership only). The focus is on those who are have made an earnest effort at starting and managing a sustainable business. Secondly, the premise throughout the paper has been to shine some light on the recovery of those who fail at self-employment regardless of whether or not their efforts earn them the vaunted mantle of "entrepreneur." The smallest of infant firms may grow to larger

enterprises, and if even a handful of non-owner employees have been hired, jobs have been created. We cannot know ex ante which of these microfirms will become significant market players, or which will introduce an interesting innovation. The jury is still out on whether smaller start-ups fail more often because their inferior capitalization cannot sustain them in rough times (Fichman and Levinthal, 1991; Aldrich and Auster, 1986) or whether they purposely start small to minimize sunk costs when they are uncertain of whether the environment is favorable, and readily quit when it is not (Caves, 1998; Ericson and Pakes, 1995). Until we know more about which exit mechanism operates in which set of circumstances, I would argue it is premature to summarily dismiss the importance of the smallest of firms.

A second limitation involves the age of the failed businesses. Due to the structure of the PSID questionnaire, it is usually unclear from year to year whether a self-employed business owner is operating the same business as in the prior year or whether he has closed the old one and started a new one. A potentially interesting question would be to determine if longer-lived failed businesses produce different wealth consequences than do firms that close soon after opening. Operating a business with greater longevity suggests a higher commitment of resources over time beyond the initial tentative entry, but could also produce solid wealth-enhancing returns in the early to middle years before closure. This question must be left for a future investigation.

Finally, exploratory data analysis uncovered the large influence of a relatively small group of high-tech firms included in the study, which cannot be ignored. Although the general direction of the failure designator points to higher wealth immediately after failure, it is the six high-tech failures that provide the final push needed to attain

statistical significance. It may very well be the case that those entrepreneurs with the knowledge and contacts to start these kinds of firms are predisposed to accumulate greater wealth even in the face of failure. If this is the case, that would lead to a revised assessment of how failure impacts the family involved in entrepreneurship outside the high-tech arena.

Implications and Avenues for Future Research

Based on the results of the mixed sample hypothesis tests, it appears that even economic failure in the sense of involuntary firm closures and opportunity costs incurred by ex-entrepreneurs is rarely debilitating. The finding that the average failed entrepreneur still walks away wealthier than a demographically comparable individual who has never owned a business can only reassure those contemplating self-employment. Given the thin characterization provided by survey numbers, it is difficult to specify exactly why this is the case and more needs to be done to determine how this effect emerges. In the meantime, there are some interesting implications for the field of entrepreneurship and how we engage practitioners.

An intriguing result from this paper is the possibility that the well-known liquidity constraints to entrepreneurship may be self-imposed as households seek to augment their precautionary savings in preparation for uncertain times ahead. Since failed households do no worse than comparable families in traditional employment, this calls into question how much of the average entrepreneur's seed capital is really at risk, or alternatively, how much seed capital is really necessary for most businesses. The results of this paper

suggest that the pre-launch accumulation of cash may have two components: the buffer

stock, meant to tide the household over in the possible lean times ahead and the start-up

capital needed to buy equipment, lease office/plant space, hire employees, etc. It seems

that most work in entrepreneurship considers only the latter aspect of resource assembly

or unwittingly conflates the two. The precautionary savings research by other authors

(Friedman, 1957; Carroll and Samwick, 1995; Bradford, 2003) should lead us to question

whether the former component may actually be larger, and perhaps responsible for the

main tenet of the liquidity constraints literature, namely that entrepreneurs need a

considerable amount of cash to start a firm.

This research may have some bearing on government programs as well. The

federal government has a long history of encouraging entrepreneurship through a variety

of agencies and policy levers (Holtz-Eakin, 2000). Scholars have found that more

forgiving bankruptcy provisions at the state level encourage the formation of businesses

(Berkowitz and White, 2004; White and Fan, 2003) yet some argue that relaxed

bankruptcy statutes result in higher costs to nascent entrepreneurs due to higher interest

rates induced by "morally hazardous" borrowers who are reckless or incompetent (Scott

and Smith, 1986). The results here suggest that bankruptcy or even significant losses are

unusual events among failed business-owners. Therefore, it is worth considering the

possibility that while bankruptcy law provides a safety net to those considering self-

employment, it is a net that is seldom used: the marginal benefit provided by new

business formations may outweigh the marginal impact of increased costs, if any, to

creditors upon failure. In any event, policy-makers keen to encourage entrepreneurship

should consider whether certain programs provide psychological comfort to potential entrepreneurs, while the natural risk-aversion of the new business owners will help prevent them from making costly mistakes for which the government must pick up the tab.

Reflections on Entrepreneurial Behavior

Finally, the attentive reader may have noticed that the findings herein fly in the face of some of the extant theories of how entrepreneurs are thought to behave. In terms of risk aversion, overconfidence and the managerial propensity to doggedly pursue a particular strategy to which one is committed even as it fails (i.e. escalation of commitment), the unsuccessful entrepreneurs in this study do not conform to some of the prevailing theories about how they will act. Instead, we see business owners entering at apparently low cost while accumulating buffer stock savings (hardly the swagger of the overconfident) and withdrawing from the field at early signs of trouble in order to preserve their savings (rather than taking on more risk and pouring more money into the doomed effort).

As an example, it has been a long-standing contention that entrepreneurs are more risk tolerant than other members of the population (Knight, 1921). This hypothesis has been subjected to a great number of tests, most comparing entrepreneurs to managers on various dimensions of risk tolerance (c.f. Cartwright, 1971; Brockhaus and Horwitz, 1985; Begley and Boyd, 1987; Cramer, Hartog, Jonker, and Van Praag, 2002). Yet even the most contemporary works on the subject cannot agree on whether entrepreneurs are truly more risk-tolerant than anyone else. Two recent meta-analyses come to opposing

conclusions on this question (Stewart and Roth, 2001; Miner and Raju, 2004). This dissertation does not address the risk tolerance of those who choose to become self-employed. However, the relatively few sample members who incurred substantial wealth reductions, even among the larger group of failures, seem to imply that after entry the experimentally-validated tendency for people to take larger gambles to avoid losses (Khaneman and Tversky, 1979) may be the exception rather than the rule in actual practice.

Similarly, a number of accounts exist that find entrepreneurs (or, more broadly, people in general) to be overconfident in assessing their chances at success (Camerer and Lovallo, 1999; Busenitz and Barney, 1997) and tend to throw good money after bad to rescue a course of action to which they have put their identity or career at stake (Khaneman and Lovallo, 1993; Staw, 1981). Little evidence of either of these behaviors can be found in the wealth profiles of those who have exited a spell of unsuccessful entrepreneurship, particularly the latter. Instead, on the whole they appear to take reasonable precautions against a loss of income as they prepare for self-employment, and they cut their losses early in the failure process.

It would be dangerous to attribute motives to the members of the dataset when we have only some economic and demographic information, however rich, about them. But it may be worth remarking on the fact that this sample represents real individuals and households facing the prospect of real financial distress. A common theme between the extant literature involving risk aversion, overconfidence and escalation of commitment is that these ideas are predominantly developed experimentally, in a laboratory setting.

Subjects are usually provided with a short context description and make choices in an

attempt to earn various small amounts of money (c.f. Khaneman and Tversky, 1979;

Camerer and Lovallo, 1999). At best, the winner receives a token amount of cash. At

worst, they go home with exactly the same amount of money they had when the entered

the experiment. All risks are hypothetical.

What is typically missing in these accounts is an environment rich in cues, clues

and context like the one in which the entrepreneur actually operates. While lab settings

can suggest useful avenues for field investigation, we must remind ourselves that there is

an imperfect match between the decision rules actors apply in a context stripped of

information and the choices actors make when situated in a familiar and (relatively)

understood environment.

This argument is similar to Gigerenzer's contention that humans demonstrate

ecological rationality rather than experimental rationality (Gigerenzer, Todd, and the

ABC Research Group, 1999; Todd and Gigerenzer, 2003). Gigerenzer and his co-authors

dispute any concept of full rationality or even optimization. Instead, they regard the

environment as an essential part in determining what search rules, decision strategies and

heuristics provide the best information at the least cost. Gigerenzer and his co-authors

find that when decision-makers are provided with an appropriate environment, a number

of divergences from what is considered optimal rationality (including overconfidence

bias) are resolved (Gigerenzer, Hoffrage and Kleinbolting, 1991). It may very well be the

case that real-life entrepreneurs with their own savings at stake and a context-laden

environment behave much differently than do university students gambling with small

amounts of found money, possibly facing known outcome probabilities, and who know they will return to their normal lives at the end of the experiment.

Future Questions About Failure

Because the phenomenon of entrepreneurial failure is so understudied, a number of promising questions remain even after we gain a greater understanding of the financial consequences. For example, population ecology regards organizational failure as a mechanism for releasing important resources back into the environment to be absorbed by other organizations (Hannan and Freeman, 1984). However, the process by which this occurs is poorly understood. What type of employment do failed entrepreneurs seek? Do they return to paid employment in the same industry (briefly touched on here), and if so, do they return to their prior employers, accept jobs with competitors or do they use their networks created during their spell of self-employment to secure a job? This question has great consequences for knowledge diffusion. What about the stakeholders of a failed enterprise? Will they be shy about getting involved with a start-up again? How does the entrepreneur's failure impact them, and what implications does this have for bankruptcy law, credit arrangements and teaming with stakeholders?

There is also a growing interest in entrepreneurial learning (see Minniti and Bygrave, 2001; Yli-Renko, Autio and Sapienza, 2001), and if popular wisdom is correct and we learn more from our failures than our successes, then it would be interesting to talk to the failures. Serial entrepreneurs interviewed by Mitchell, Mitchell and Smith

(2004) often spoke of gaining valuable lessons from their prior unsuccessful experience. However, Shepherd (2003) has speculated that entrepreneurial failures offer little potential for learning when an emotional investment has been made in the enterprise. He suggests that the grieving process interferes with learning from failure. Reconciling the tension between these viewpoints is but one example of future interesting qualitative work.

Finally, the concept of failure itself and how we define it deserves discussion. As mentioned, I have defined it in economic terms and operationalized it as 1) business closure with losses, or 2) closure resulting in the entrepreneur returning to employment paying less than what was earned the year prior (an economic failure from an opportunity cost standpoint). However, research suggests that economics are only one reason an individual decides to enter self-employment and maybe not even the most important one (Hamilton, 2000). The entrepreneur is a person who pursues his life's projects in harmony with enterprise, a person for whom the source of his paycheck is also an exercise of his autonomy and (hopefully) a triumph of personal goals and values. Other scholars have noted that businesses that just broke even before closing are often regarded as successes by their owners (Bates, 2002; Dennis and Fernald, 2001). Again, there is more to entrepreneurship than making money. There are also values, interpersonal relationship and goal achievement. This facet of the failure story can be extended into the business ethics literature as well.

This paper has merely touched the surface of the phenomenon of entrepreneurial failure. Much remains to be explored about the aftermath of failure not only as it affects the entrepreneur and her family, but also the stakeholders who supported the young venture, the workplaces that accept the founders after closure, and, just as importantly, the new starts that the failed entrepreneurs create from the ashes of the old. If the discoveries that await us are as surprising as the findings discussed in this paper, then I look forward to a program of research into failure that is both interesting to scholars and useful to practitioners.

References

Aldrich, H.E. and E.R. Auster. (1986). "Even Dwarfs Started Small: Liabilities of Age and Size and Their Strategic Implications," in B.M. Staw and L.L. Cummings (eds) Research in Organizational Behavior, 8: 165-198. Greenwich, CT: JAI Press.

Aldrich, H.E. and C.M. Fiol. (1994). "Fools Rush In? The Institutional Context of Industry Creation," *Academy of Management Review* 19(4): 645-670.

Amit, R., E. Muller and I. Cockburn. (1995). "Opportunity Costs and Entrepreneurial Activity," *Journal of Business Venturing*, 10: 95-106.

Ando, A. and F. Modigliani. (1963). "The 'Life Cycle' Hypothesis of Saving: Aggregate Implications and Tests," *The American Economic Review*,   55-84.

Ang, J.S., J.W. Lin, and F. Tyler. (1995). "Evidence on the Lack of Separation Between Business and Personal Risks Among Small Businesses," *Journal of Small Business Finance* 4: 197–210.

Angrist, J.D. and A.B. Krueger. (1999). "Empirical Strategies in Labor Economics," in the Handbook of Labor Economics, Vol 3, eds O. Ashenfelter and D. Card. Elsevier, pp.1277- 1366.

Arkes, H.R. and C. Blumer (1985). "The Psychology of Sunk Costs," *Organizational Behavior and Human Decision Processes*, 35(1): 124-140.

Aronson, R.L. (1991). Self Employment: A Labor Market Perspective. ILR Press, Ithaca, NY.

Aronsson, M. / D.L. Birch. (2004). "Education Matters – But Does Entrepreneurship Education? An Interview With David Birch," *Academy of Management Learning and Education* 3(3): 289-292.

Arrow, K.J. (1974) "Limited Knowledge and Economic Analysis." *American Economic Review*, 64(1): 1-10.

Associated Press, 18 Oct 2004. "Study: Wealth Gap Widened For Blacks and Hispanics," http://www.cnn.com/2004/US/10/18/minorities.wealth.ap/index.html

Audretsch, D.B. (1991). "New-Firm Survival and the Technological Regime," *The Review of Economics and Statistics*, 441-450.

Avery, R.B., R.W. Bostic and K.A. Samolyk. (1998). "The Role of Personal Wealth in Small Business Finance," *Journal of Banking and Finance*, 22(6-8): 1019-1061.

Bates, T. (2002). "Analysis of Small Firms That Have Closed: Delineating Successful From Unsuccessful Closures," Center For Economic Studies, Washington D.C.

Becker, G. (1975). Human Capital. New York, NY: Columbia University Press.

Becketti, S., W. Gould, L. Lillard, and F. Welch. (1988). "The PSID After Fourteen Years: An Evaluation." *Journal of Labor Economics* 6(4): 472-492.

Begley, T.M. and D.P. Boyd. (1987). "Psychological Characteristics Associated with Performance in Entrepreneurial Firms and Smaller Businesses," *Journal of Business Venturing*, 2: 79-93.

Berger, A.N. and G.F. Udell. (1998). "The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle," *Journal of Banking and Finance*, 22(6-8): 613-673.

Berkowitz, J. and M.J. White (2004). "Bankruptcy and Small Firms' Access to Credit," *Rand Journal of Economics*, 35(1): 69-84.

Bernheim, B.D., J. Skinner and S. Weinberg (1997). "What Accounts for the Variation in Retirement Wealth Among U.S. Households?" NBER Working Paper.

Bettman, J. and B. Weitz. (1983). "Attributions in the Boardroom: Causal Reasoning in Corporate Annual Reports," *Administrative Science Quarterly*, 28, 165-183.

Birch, D.L. (1979). The Job Generation Process. Cambridge, MA: M.I.T. Program on Neighborhood and Regional Change.

Blau, F. and D. Graham (1990) "Black-White Differences in Wealth and Asset Composition" *Quarterly Journal of Economics* 105: 321-339.

Bloemen, H.G. (2002). "The Relation Between Wealth and Labour Market Transitions: An Empirical Study For the Netherlands," *Journal of Applied Econometrics* 17(3): 249-268.

Boden, R.J., Jr. (2000). "Analyses of Business dissolution by Demographic Category of Business Ownership," Office of Advocacy, U.S. Small Business Administration.

Boden, R.J., Jr and A.R. Nucci. (2000) "On the Survival Prospects of Men's and Women's New Business Ventures," *Journal of Business Venturing*, 15(4): 347-362.

Borjas, G.J. (1986) "The Self-Employment Experience of Immigrants," *Journal of Human Resources*, 21: 487-506.

Borjas G.J. and S.G. Bronars. (1989). "Consumer Discrimination and Self-Employment,"

Journal of Political Economy, 97: 581-605.

Bradford, W.D. (2003) "The Wealth Dynamics of Entrepreneurship for Black and White Families in the U.S." *Review of Income and Wealth* 49(1): 89-116.

Branchflower, D.G. and A.J. Oswald. (1992). "Entrepreneurship, Happiness, and Supernormal Returns: Evidence from Britain and the United States," NBER Working Paper 4228. National Bureau of Economic Research. Available at http://papers.nber.org/papers/w4228.v5.pdf

Branchflower, D.G. and A.J. Oswald. (1998). "What Makes an Entrepreneur?" *Journal of Labor Economics*, 16(1): 26-50.

Brockhaus, R.H., Sr. and P.S. Horwitz. (1985). "The Psychology of the Entrepreneur," in D.L. Sexton and R.W. Smilor (Eds) The Art and Science of Entrepreneurship. Cambridge, MA: Ballinger.

Brockhaus, R.H., Sr. (1980). "Risk Taking Propensity of Entrepreneurs," *Academy of Management Journal* 23(3): 509-520.

Bruderl, J., P. Preisendorfer and R. Ziegler. (1992). "Survival Chances of Newly Founded Business Organizations," *American Sociological Review*, 57(2): 227-242.

Bruno, Albert V., J.K. Leidecker, and J.W. Harder. (1986). "Patterns of Failure Among Silicon Valley High Technology Firms," in Frontiers of Entrepreneurship Research, Center for Entrepreneurial Studies, Babson College: Wellesley, MA. Pp 677-694.

Burke, A.E., F.R. FitzRoy and M.A. Nolan. (2002). "Self-Employment Wealth and Job Creation: The Roles of Gender, Non-Pecuniary Motivation and Entrepreneurial Ability," *Small Business Economics*, 19(3): 255-270.

Buron, L., R. Haveman, S. Hill, and B. Wolfe (1995). "The Loss of Earnings Capability from Disability/Health Limitations: Toward a New Social Indicator," *Review of Income and Wealth*. 41(3): 289-308.

Busenitz, L.W. and J. Barney (1997). "Differences Between Entrepreneurs and Managers In Large Organizations: Biases and Heuristics in Strategic Decision-Making," *Journal of Business Venturing* 12(1): 9-30.

Camerer, Colin and Dan Lovallo (1999). "Overconfidence and Excess Entry: An Experimental Approach," *American Economic Review* 89(1): 306-318.

Carroll, C.D. (1997). "Buffer Stock Saving and the Life Cycle/Permanent Income Hypothesis," *The Quarterly Journal of Economics*, 112(1): 1-55.

Carroll, C.D. and A.A. Samwick. (1995). "The Nature of Precautionary Wealth." NBER Working Paper W5193. http://ssrn.com/abstract=225256.

Carroll, G.R. and J. Delacroix. (1982). "Organizational Mortality in the Newspaper Industries of Argentina and Ireland: An Ecological Approach," *Administrative Science Quarterly*, 27: 169-198.

Carroll, G.R and E. Mosakowski. (1987). "The Career Dynamics of Self-Employment," *Administrative Science Quarterly*, 32: 570-589.

Cartwright, D. (1971). "Risk-Taking By Individuals and Groups," *Journal of Personality and Social Psychology*. 20(3): 361-78.

Cassar, G. (2004). "The Financing of Business Start-ups," *Journal of Business Venturing*, 19: 261-283.

Caves, R.E. (1998). "Industrial Organization and New Findings on the Turnover and Mobility of Firms," *Journal of Economic Literature,* 36: 1947-1982.

Chandler, G.N. and S.H. Hanks. (1998) "An Examination of the Substitutability of Founders' Human and Financial Capital in Emerging Business Ventures," *Journal of Business Venturing*, 13(5): 353-369.

Cohen, J., P. Cohen, S.G. West and L.S. Aiken (2003). Applied Multiple Regression / Correlation Analysis for the Behavioral Sciences. 3rd ed, Mahwah, NJ: Lawrence Erlbaum Publishers.

Cooper, A.C., F. Gimeno-Gascon and C. Woo. (1994). "Initial Human Capital and Financial Capital as Predictors of New Venture Performance," *Journal of Business Venturing* (9)5: 371–395.

Cooper, A.C., W.C. Dunkelberg, and C.Y. Woo. (1988). "Survival and Failure: A Longitudinal Study," Frontiers of Entrepreneurship Research, Ed B.A. Kirchoff. Wellesley, MA: Babson College.

Cooper, A.C., C.Y. Woo and W.C. Dunkelberg. (1989). "Entrepreneurship and the Initial Size of Firms," *Journal of Business Venturing*, 4(5): 317-332.

Cramer, J.S., J. Hartog, N. Jonker, and C.M. Van Praag. (2002). "Low Risk Aversion Encourages the Choice for Entrepreneurship: An Empirical Test of a Truism," *Journal of Economic Behavior and Organization* 48(1): 29-36.

Crowe, E. and E.T. Higgins, (1997). "Regulatory Focus and Strategic Inclinations: Promotion and Prevention in Decision-Making," *Organizaitonal Behavior and Human Decision Making Processes* 69: 117-132.

Curtin, R., F.T. Juster and J. Morgan. (1988). "Survey Estimates of Wealth: An Assessment of Quality," in The Measurement of Saving, Investment and Wealth, Eds R. Lipsey and H. Tice. Chicago: University of Chicago Press.

Davidsson, P. and B. Honig. (2003). "The Role of Social and Human Capital Among Nascent Entrepreneurs," *Journal of Business Venturing*, 18(3): 301-331.

Deaton, A. (1991). "Saving and Liquidity Constraints," *Econometrica*, 59(5): 1221-1248.

Deaton, A. and C. Paxson. (2000). "Growth and Saving Among Individuals and Households," *The Review of Economics and Statistics*, 82(2): 212-225.

Dennis, W.J., Jr. (1999). "Businesses Stops and Starts," from the Wells Fargo/NFIB Education Foundation.

Dennis, W.J., Jr. and L. W. Fernald, Jr. (2001). "The Chances of Financial Success (and Loss) from Small Business Ownership," *Entrepreneurship Theory and Practice*, Fall 2001. Pp. 75-83.

Diaz-Gimenez, J., V. Quadrini and J.-V. Rios-Rull. (1997). "Dimensions of Inequality: Facts on the U.S. Distributions of Earnings, Income and Wealth," *Quarterly Review – Federal Reserve Bank*, 21(2): 3-21.

Dillman, D.A. (2000). Mail and Internet Surveys: The Tailored Design Method. 2nd Edition. New York: Wiley and Sons.

Duchesneau, D.A. and W.B. Gartner. (1990). "A Profile of New Venture Success and Failure in an Emerging Industry," *Journal of Business Venturing*, 5: 297-312.

Dunne, T., M.J. Roberts and L. Samuelson. (1989). "The Growth and Failure of U.S. Manufacturing Plants," *The Quarterly Review of Economics* 104; 672-698.

Dynan, K.E. (1993). "How Prudent Are Consumers?" *The Journal of Political Economy*, 101(6): 1104-1113.

Ericson, R. and A, Pakes. (1995). "Markov-Perfect Industry Dynamics," *Review of Economic Studies*, 62: 53-82.

Evans, D.S. and B. Jovanovic. (1989). "An Estimated Model of Entrepreneurial Choice Under Liquidity Constraints," *Journal of the Political Economy,* 97 (August): 808-827.

Evans, D.S. and L.S. Leighton. (1989). "Some Empirical Aspects of Entrepreneurship," *The American Economic Review*, 79 (June): 519-535.

Everett, J. and J. Watson. (1998). "Small Business Failures and External Risk Factors," *Small Business Economics*, 11(4): 371-390.

Fairlie, R.W. (1999). "The Absence of the African-American Owned Business: An Analysis of the Dynamics of Self-Employment," *Journal of Labor Economics* 17(1): 80-108.

Fairlie, R.W., and B.D. Meyer (1996). "Ethnic and Racial Self-Employment Differences and Possible Explanations," *Journal of Human Resources* 31: 757-93.

Fan, W. and M.J. White (2003). "Personal Bankruptcy and the Level of Entrepreneurial Activity," *Journal of Law and Economics*, 46: 543-568.

Ferrer, E., A. Hamagami, and J.J. McArdle (2004). "Modeling Latent Growth Curves with Incomplete Data Using Different Types of Structural Equation Modeling and Multilevel Software," *Structural Equation Modeling* 11(3): 452-483.

Fichman, M. and D.A. Levinthal. (1991). "Honeymoons and the Liability of Adolescence: A New Perspective on Duration Dependence in Social and Organizational Relationships," *Academy of Management Review*, 16(2): 442-468.

Fiske, S.T. and S.E. Taylor. (1991). Social Cognition. New York, NY. McGraw-Hill.

Fitzgerald, J., P. Gottschalk and R. Moffitt (1998). "An Analysis of the Impact of Sample Attrition On the Second Generation of Respondents in the Michigan Panel study of Income Dynamics," *The Journal of Human Resources*, 33(2): 300-345.

Freeman, J., G.R. Carroll and M.T. Hannan. (1983). "The Liability of Newness: Age-Dependence in Organizational Death Rates," *American Sociological Review* 48: 692-710.

Friedman, M. (1957). A Theory of the Consumption Function. Princeton University Press, Princeton.

Gartner, W.B. (1990), "What Are We Talking About When We Talk About Entrepreneurship," *Journal of Business Venturing*, 5: 15-28.

Gaskill, L.R., H.E. Van Auken and R.A. Manning (1993). "A Factor Analytic Study of the Perceived Causes of Small Business Failure," *Journal of Small Business Management*, 31(4): 18-31.

Gigerenzer, G., U. Hoffrage and H. Kleinbolting, (1991). "Probabilistic Mental Models: A Brunswikian Theory of Confidence," *Psychological Review* 98: 506-528.

Gigerenzer, G., P.M. Todd and the ABC Research Group (1999). Simple Heuristics That Make Us Smart. New York: Oxford University Press.

Gimeno, J., T.B. Folter, A.C. Cooper and C. Woo (1997). "Survival of the Fittest? Entrepreneurial Human Capital and the Persistence of Underperforming Firms," *Administrative Science Quarterly*, 42(4): 750-783.

Gordon, R.H. (1998). "Can High Personal Tax Rates Encourage Entrepreneurial Activity?" *International Monetary Fund, Staff Papers* 45(1): 49-82.

Gourinchas, P.-O., and J.A. Parker. (2002). "Consumption Over the Life Cycle," *Econometrica*, 70(1): 47-89.

Hamilton, B.H. (2000). "Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment," *The Journal of Political Economy* 108(3): 604-631.

Hannan, M. and J. Freeman. (1984). "Structural Inertia and Organizational Change," *American Sociological Review* 49: 149-164.

Harting, T.R., S.S. Harmeling and S. Venkataraman. (2005). "Innovative Stakeholder Relations: When "Ethics Pays" (and When it Doesn't)," *Business Ethics Quarterly*. In Press.

Headd, B. (2003). "Redefining Business Success: Distinguishing Between Closure and Failure," *Small Business Economics* 21: 51-61.

Heo, M., M.S. Faith, J.W. Mott, B.S. Gorman, D.T. Redden and D.B. Allison (2003). "Tutorial in Biostatistics: Hierarchical Linear Models for the Development of Growth Curves: An Example with Body/Mass Index in Overweight/Obese Adults," *Statistics in Medicine*, 22: 1911-1942.

Higgins, E.T. and S. Spiegel (2004). "Promotion and Prevention Strategies for Self-Regulation: A Motivated Cognition Perspective," Working Paper. Available at www.columbia.edu/cu/psychology/ **higgins**/papers/**higgins**spiegel2004.doc

Higgins, E.T., R.S. Friedman, R.E. Harlow, L.C. Idson, O.N. Ayduk, and A. Taylor. (2004). "Achievement Orientations from Subjective Histories of Success: Promotion Pride Versus Prevention Pride," European Journal of Social Psychology, 31(1): 3-23.

Hill, M.S. (1992). The Panel Study of Income Dynamics: A User's Guide. Sage: Newbury Park.

Holtz-Eakin, D. (2000). "Public Policy Toward Entrepreneurship," *Small Business Economics*, 15(4): 283-291.

Holtz-Eakin, D. D. Joulfaian, and H.S. Rosen. (1994a). "Sticking It Out: Entrepreneurial Survival and Liquidity Constraints," *The Journal of Political Economy*, 102(1):

53-75.

Holtz-Eakin, D. D. Joulfaian, and H.S. Rosen. (1994b). "Entrepreneurial Decisions and Liquidity Constraints," *RAND Journal of Economics*, 25(2): 334-347.

Honig, B. (2004), "Entrepreneurship Education: Toward a Model of Contingency-Based Planning," *Academy of Management Learning and Education* 3(3): 258-273.

Honig, B. (1998). "What Determines Success? Examining the Human, Financial and Social Capital of Jamaican Microentrepreneurs," *Journal of Business Venturing* 13(5): 371-394.

Hubbard, R.G., J. Skinner and S.P. Zeldes (1995). "Precautionary Saving and Social Insurance," *Journal of Political Economy*, 103(2): 360-399.

Hubbard, R.G., J. Skinner and S.P. Zeldes (1993). "The Importance of Precautionary Motives in Explaining Aggregate and Individual Saving," NBER Working Paper 4516. National Bureau of Economic Research. Available at http://www.nber.org/papers/w4516.pdf

Hurst, E. and A. Lusardi (2004). "Liquidity Constraints, Household Wealth, and Entrepreneurship," *The Journal of Political Economy*, 112(2): 319-347.

Hutchinson, R.G., A.R. Hutchinson, and M. Newcomer (1938). "A Study in Business Mortality," *American Economic Review*, 28(3), 497-514.

James, W. (1975). Pragmatism and The Meaning of Truth. Harvard University Press: Cambridge, MA.

Johnson, W.R. and J. Skinner (1986). "Labor Supply and Marital Separation," *American Economic Review* 76 (June): 455-469.

Kazarosian, M. (1997). "Precautionary Savings – A Panel Study," *The Review of Economics and Statistics*, 79(2): 241-247.

Khaneman, D. and A. Tversky. (1979). "Prospect Theory: An Analysis of Decision under Risk ," *Econometrica*, 47(2): 263-292.

Khaneman, D. and D. Lovallo. (1993). "Timid Choices and Bold Forecasts: A Cognitive Perspective on Risk Taking," Management Science 39(1): 17-31.

Kim, Y. S. and F. P. Stafford (2000). "The Quality of PSID Income Data in the 1990's and Beyond" reported in the PSID Online Guide at http://psidonline.isr.umich.edu/Guide/Quality/q_inc_data.html

Kirzner, I. M. (1979). Perception, Opportunity and Profit. Chicago: University of Chicago Press.

Knight, F. H. (1921) <u>Risk, Uncertainty, and Profit</u>. Chicago: University of Chicago Press.

Littell, R.C., W.W. Stroup, and R.J. Freund. (2002). <u>SAS For Linear Models</u>. 4th ed. Cary, NC: The SAS Institute.

Luoh, M.-C., and F. Stafford. (1998). "Estimating Risk Tolerance from the PSID."

Lupton, J. and F. Stafford (2000). "Five Years Older: Much Richer or Deeper in Debt?" Working Paper, University of Michigan. Available at http://psidonline.isr.umich.edu/Publications/Papers/FiveYearsOlder.pdf

MacMillan, I. (1986). "To Really Learn About Entrepreneurship, Let's Study Habitual Entrepreneurs," *Journal of Business Venturing* 1: 241–243.

McGrath, R.G. (1999). "Falling Forward: Real Options Reasoning and Entrepreneurial Failure," *Academy of Management Review*, 24(1): 13-30.

McNeill, M.A. and R.F. Fullenbaum (1994). "Function of Failure," Office of Advocacy, U.S. Small Business Administration. National Technical Information Service: Springfield, VA.

Meyer, (1990). "Why Are Their So Few Black Entrepreneurs?" National Bureau of Economic Research Working paper no. 3537. Available at http://papers.nber.org/papers/w3537.v5.pdf

Meyer, M.W. and L.G. Zucker (1989). <u>Permanently Failing Organizations</u>. Sage: Newbury Park, CA.

Miner, J.B. and N.S. Raju. (2004). "Risk Propensity Differences Between Managers and Entrepreneurs and Between Low- and High-Growth Entrepreneurs: A Reply in a More Conservative Vein," *Journal of Applied Psychology* 89(1): 3-13.

Minitti, M. and W. Bygrave. (2001). "A Dynamic Model of Entrepreneurial Learning," *Entrepreneurship Theory and Practice*, 25(3): 5-16.

Mitchell, R.K., J.R. Mitchell, and J.B. Smith (2004). "Failing to Succeed: New Venture Failure as a Moderator of Startup Experience and Startup Expertise," presented at the 2004 Babson Kauffman Entrepreneurship Research Conference, Glasgow, Scotland.

Phan, P.H. and M.D. Foo (2004). "Technological Entrepreneurship in Emerging Regions," *Journal of Business Venturing*, 19(1): 1-5.

Phillips, B.D. (1993). "The Influence of industry and Location on Small Firm Business

Failure Rates," in <u>Frontiers of Entrepreneurship Research</u>, Center for Entrepreneurial Studies, Babson College: Wellesley, MA. pp 286-301.

Phillips B. and B.A. Kirchhoff. (1989). "Formation, Growth and Survival; Small Firm Dynamics in the U.S. Economy," *Small Business Economics* 1, 65-74.

Phillips, B. and B.A. Kirchhoff. (1988). "The Effect of Firm Formation and Growth on Job Creation in the United States," *Journal of Business Venturing*, 3(4): 261-272.

Quadrini, V. (2000). "Entrepreneurship, Saving, and Social Mobility," *Review of Economic Dynamics*, 3: 1-40.

Quadrini, V. and J.V. Rios-Rull. (1997). "Understanding the U.S. Distribution of Wealth," Quarterly Review – Federal Reserve Bank. Federal Reserve Bank of Minneapolis, Spring 1997: 22-36.

Rae, D. (2002) "Entrepreneurial Emergence: A Narrative Study of Entrepreneurial Learning In Independently Owned Media Businesses," *Entrepreneurship and Innovation*. 3(1): 53-59.

Rees, H. and A. Shah. (1986). "An Empirical Analysis of Self-Employment in the U.K.," *Journal of Applied Econometrics*, 1: 95-108.

Reynolds, P.D. (1987). "New Firms Societal Contribution Versus Survival Potential," *Journal of Business Venturing* 2, 231-246.

Sarasvathy, S.D. (2001). "Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency," *Academy of Management Review*, 28(2): 243-263.

Sarasvathy, S.D. (2002). "Entrepreneurship as Economics with Imagination," *Business Ethics Quarterly*, Ruffin Series No. 3, Ethics and Entrepreneurship. 95-112.

Sarasvathy, S.D. and A. Menon (2002). "Failing Firms and Successful Entrepreneurs: Serial Entrepreneurship as a Simple Machine," Working Paper.

Scott, J.A., and T.C. Smith (1986). "The Effect of the Bankruptcy Reform Act of 1978 On Small Business Loan Pricing," *Journal of Financial Economics*, 16: 119-140.

Shane, S. (1996). "Explaining Variation in Rates of Entrepreneurship In the United States: 1899-1988," *Journal of Management*, 22(5): 747-781.

Shaver, K.G. and L.R. Scott (1991). "Person, Process, Choice: The Psychology of New Venture Creation," *Entrepreneurship Theory and Practice*, 16(2): 23-45.

Shepherd, D.A. (2004). "Educating Entrepreneurship Students About Emotion and

Learning From Failure," *Academy of Management Learning and Education* 3(3): 274-287.

Shepherd, D.A. (2003). "Learning From Business Failure: Propositions of Grief Recovery for the Self-Employed," *Academy of Management Review*, 28(2): 318-328.

Shepherd, D.A., E.J. Douglas and M. Shanley (2000). "New Venture Survival: Ignorance, External Shocks, and Risk Reduction Strategies," Journal of Business Venturing, 15: 393-410.

Singer, J.D. (1998) "Using SAS PROC MIXED to Fit Multilevel Models, Hierarchical Models and Individual Growth Models," *Journal of Educational and Behavioral Statistics*, 24(4): 323-355.

Singh, J.V., D.J. Tucker and R.J. House. (1986). "Organizational Legitimacy and the Liability of Newness," *Administrative Science Quarterly*, 31: 171-193.

Skinner, J. (1988). "Risky Income, Life Cycle Consumption, and Precautionary Savings," *Journal of Monetary Economics*, 22: 237-255.

Staw, B.M. (1981). "The Escalation of Commitment to a Course of Action," *Academy of Management Review*, 6(4): 577-587.

Staw, B.M. and J. Ross. (1987). "Knowing When to Pull the Plug," *Harvard Business Review*, 65(2): 68-74.

Stewart, W.H. and P.L. Roth. (2001). "Risk Propensity Differences Between Entrepreneurs and Managers: A Meta-Analytic Review."

Stinchcombe, A. (1965). "Organizations and Social Structure." In J.G. March (ed) Handbook of Organizations. Chicago: Rand-McNally, pp. 142-193.

Sullivan, T.A., E. Warren and J. Westbrook. (1998). "Financial Difficulties and Reasons For Their Failure," U.S. Small Business Administration.

Tellis, G.J. and P.N. Golder. (1996). "First to Market, First to Fail? Real Causes of Enduring Market Leadership," *Sloan Management Review* 37(2): 65-75.

Todd, P.M. and G. Gigerenzer. (2003). "Bounding Rationality to the World," *Journal of Economic Psychology*, 24: 143-165.

Tukey, J.W. (1977). Exploratory Data Analysis. New York: Addison-Wesley.

Tversky, A. and D. Khaneman. (1971). "The Belief in the 'Law of Small Numbers,'" *Psychological Bulletin*, 76:105-110.

Tversky, A. and D. Khaneman. (1974). "Judgment Under Uncertainty: Heuristics and Biases," *Science*, 185: 1124-1131.

U.S. Bureau of the Census (1999). *Characteristics of Business Owners*, Washington D.C.: Government Printing Office

Van Auken, H.E. and L. Neeley. (1996). "Evidence of Bootstrap Financing Among Small Start-up Firms," *Journal of Entrepreneurial and Small Business Finance*, 5(3): 235-249.

Van Praag, C.M. (2003). "Business Survival and Success of Young Business Owners," *Small Business Economics*, 21(1): 1-17.

Venkataraman, S., A.H. Van de Ven, J. Buckeye and R. Hudson (1990). "Starting Up in a Turbulent Environment: A Process Model of Failure among Firms with High Customer Dependence," *Journal of Business Venturing* 5: 277-295.

Verbeke, G. and G. Molenberghs, eds. (1997). Linear Mixed Models in Practice: A SAS Oriented Approach. Springer: New York.

Verbeke, G. and G. Molenberghs. (2000). Linear Mixed Models For Longitudinal Data. Springer: New York.

Watson, J. and J. Everett (1996) "Do Small Businesses Have High Failure Rates?" *Journal of Small Business Management* 34(4): 45-62.

Williams, D.R. (2004). "Youth Self Employment: Its Nature and Consequences," *Small Business Economics* 23: 323-336.

Williams, M. (1993). "Measuring Business Starts, Success and Survival: Some Database Considerations," *Journal of Business Venturing* 8, pp. 295-299.

Wu, S. (2003). "The Effects of Health Events on the Economic Status of Married Couples," *The Journal of Human Resources*, 38(1): 219-229.

Yli-Renko, H., E. Autio and H.J. Sapienza. (2001). "Social Capital, Knowledge Acquisition, and Knowledge Exploitation In Young Technology-Based Firms," *Strategic Management Journal* 22: 587-613.

Zacharakis, A., Meyer, G.D. and J. De Castro. (1999). "Differing Perceptions of New Venture Failure: A Matched Exploratory Study of Venture Capitalists and Entrepreneurs," *Journal of Small Business Management*, 37(3): 1-14.

Appendix A – Dropout Test Results

The following tables show the results of logistic and probit analyses designed to evaluate what factors influence the likelihood that a household will drop out of the study. In both regressions, those sampled households which had vanished by Time 2 were labeled as dropouts (drop=1) while those that remained received a drop value of 0. Results for race were nonsensical since there were too few minorities from which to generalize. The probit analysis models the probability of *retention* associated with each level of the independent variable. The logit analysis provides relative odds of *dropout* associated with each variable.

Probit results:

Effect	Prob Estimate	Lower conf. limit (95%) of estimate	Upper C.L. (95%) of estimate.	P value
Wealth	-0.000	-0.00	0.00	0.8612
Age	0.0036	-0.0156	0.0277	0.7161
Educ	0.0399	-0.0494	0.1292	0.3810
Race	--	--	--	--
Married	0.4932	1.076	7.604	0.0283
Failed	-0.4547	-0.9141	0.0047	0.0524

The logistic regression, using a slightly different method of calculation, provides the same basic results:

Effect	Point Estimate (Odds Ratio)	Lower conf. limit (95%) of point estimate	Upper C.L. (95%) of point estim.	P value
Wealth	1.000	1.00	1.00	0.816
Age	0.991	0.953	1.031	0.7161
Educ	0.915	0.762	1.100	0.3810
Race	--	--	--	--
Married	0.333	0.127	0.871	0.0283
Failed	2.860	1.076	7.604	0.0524

Here, statistically significant odds ratios greater than one (for variable "failed" in this case) indicate that subjects scoring "1" on the variable are a greater risk to drop out. Significant odds ratios less than one ("married") indicate that subjects scoring "1" (married couples) are less likely to drop out. Thus, failed households almost three times more likely to drop out of the sample than nonfailures; married households are only a third as likely to drop out, or stated another way, are three times more likely to be retained than an individual first identified as single.